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REPORT TO THE CONGRESS

196

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

The U.S. Fishing Industry--Present Condition And Future Of Marine Fisheries

The United States, with the fourth largest coastline and the third largest continental shelf in the world, has almost one-fifth of the world's marine fish resources within 200 miles of its coastline. It might be expected that, with the abundance of resources, our fishing industry would be strong and prosperous but this is not the case. Domestic landings of edible fish have remained constant since 1960 and some segments of the harvesting sector are in a chronically depressed state. The demand for fish has increased but U.S. landings have supplied a declining share of the domestic market while imports of edible species have increased sharply to a point where it represents 62 percent of the total demand for edible fish products. This resulted in a fish trade deficit of $1.4 billion in 1974. Opportunities exist to strengthen and expand the U.S. fishing industry by increasing the harvest and the efficiency of harvesting operations and overcoming barriers in processing, marketing, and distributing fish and fish products.

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COMPILATION AND ANALYSIS OF FEDERAL LAWS AFFECTING THE U.S. COMMERCIAL FISHING INDUSTRY

SUMMARY OF LEGISLATIVE COMMENTS

I. General

The fishery laws, generally, could be improved with some reorganization, recodification, and clarification.

First, Congress might consider reorganizing and recodifying most of the fishery laws under one title of the United States Code. While many of the laws are now in title 16, many others are scattered throughout other titles (e.g., titles 15 and 46) of the Code. Either title 15 or title 16 would be a logical place for the fishery laws. Of course, there are laws that pertain to fisheries that also pertain to other matters and would be best left in place.

Fisheries laws, when revised and recodified, should be separated from wildlife laws and from shipping laws. Fish conservation appears to be different from wildlife conservation and properly should be treated separately. Likewise, it might be helpful to separate fish-related laws from general shipping laws. In such areas as research and financial assistance to the fishing industry, consolidation of the laws would also be beneficial.

Further, in recodifying the laws, the powers and the duties and responsibilities of the Secretary of Commerce could be clearly defined to reflect the transfer of functions under Reorganization Plan No. 4 of 1970. For example, 16 U.S.C. §742h, which lists a variety of Fish and Wildlife Reports to be made by the Secretary of the Interior, has been changed by the Reorganization Plan. The statute does not reflect this change except for a note at the end of the provision that does not help define the functions transferred to the Secretary of Commerce without reference to the Reorganization Plan itself, and this does not, in all cases, completely clarify matters. A provision of law like section 742h could be divided into two separate statutes--one designating wildlife reports required of the Secretary of the Interior and the other designating fish reports required of the Secretary of Commerce. Many laws could be changed in the same way.

II. Specific

There are many instances where specific laws could be improved by amendment. These are divided into several different categories and summarized below.

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A. Research and related activities

There are several instances in which research statutes are inconsistent or overlap with each other. For example: 16 U.S.C. §742d(4) and 16 U.S.C. §760e seem to overlap somewhat since both deal with statistics related to sport fishing. They could be combined into one statute dealing with sport fishing statistics and research.

Methods and gear determined under section 1381 of title 16 to be desirable to reduce incidental taking of marine mammals are different from gear limitations determined under 16 U.S.C. §760a to be desirable. To this extent they are inconsistent and should refer to each other so that research called for under each is conducted with consideration given to research called for by the other; e.g., research on gear limitations to protect marine mammals under section 1381 should take into consideration gear limitations that would serve the purpose of developing and protecting species as called for by section 760a.

16 U.S.C. §744 and 16 U.S.C. §1202 both deal with problem species (species that pose a threat to other species, to man, or to both) and might be combined into one provision under which research could remain separate or could be combined.

14 U.S.C. §94 and 16 U.S.C. §758a overlap to the extent that the Coast Guard might do oceanographic research related to fisheries. Perhaps section 94 should be amended to preclude the Coast Guard from doing any research related to fisheries that the Secretary of Commerce is authorized to pursue. The Commission on Marine Science, Engineering, and Resources is also directed to do oceanographic research under 33 U.S.C. §1104.

Several statutes--16 U.S.C. §§742d-1 and 665 and 33 U.S.C. §§1441 and 1442--overlap in dealing with research on the effects of pollution and other environmental factors on fish. It might be appropriate to combine these into one statute providing for one or more research programs to be conducted by the Administrator of EPA.

Section 304(e) of the 1976 Act encompasses several other research statutes--16 U.S.C. §§742d, 744, 758a and 33 U.S.C. §§1441, 1442. Section 304(e) might be a good place in which to centralize research laws.

In addition to overlaps and inconsistencies, the problem of determining whether a statute is to be administered by the Secretary of Commerce or by the Secretary of the Interior exists among

research statutes. For example, 16 U.S.C. §742d(5), directs the Secretary of the Interior to collect statistics on the nature and availability of wildlife and it is not clear whether the Secretary of Commerce may be authorized by this section to collect certain statistics. Although most of the research called for by section 742d appears, under the Reorganization Plan, to be the responsibility of the Secretary of Commerce, the statute makes reference only to the Secretary of Interior.

Another problem area has resulted from the relatively recent enactment of the Fish Conservation and Management Act of 1976. The problem is to properly coordinate existing laws with the 1976 Act. Section 760a of title 16, which provides for certain studies to recommend to the States measures to be taken to protect and develop fish resources, could be coordinated with the 1976 Act by amending it to refer to the appropriate regional councils.

Congress might want to consider reorganization and recodification of the research laws, clearly setting out duties and powers.

B. Conservation measures

While there does not appear to be much inconsistency or overlapping among the conservation-related laws, a few should be mentioned:

(1) 16 U.S.C. §755 and 16 U.S.C. §1221 et seq., overlap to the extent that section 755 makes for the Columbia River Basin the specific provision that section 1221 makes generally applicable to the Nation's entire estuary system.

(2) 16 U.S.C. §§757a and b authorize the Secretary of the Interior (apparently transferred to Commerce), in cooperation with the States, to undertake conservation measures with regard to anadromous fisheries, while 16 U.S.C. §1221 et seq., directs the Secretary of the Interior, in cooperation with the States, to take conservation measures with regard to resources in the estuaries of the U.S. Since anadromous fisheries are present in some U.S. estuaries, management functions potentially overlap between the Secretaries of Commerce and Interior. Congress might want to reconcile this by qualifying 16 U.S.C. §1221 et seq. to exclude regulation of anadromous fisheries, thus consolidating the functions in the Secretary of Commerce. It has already been suggested that Congress might want to consider transferring management of the estuaries, to the extent it affects fisheries, to the Secretary of Commerce.

(3) 16 U.S.C. §§757a and b and 16 U.S.C. §1221 et seq., also overlap with 16 U.S.C. §777 et seq., which directs the Secretary of the Interior, in cooperation with the States, to restore and manage sport fisheries. To the extent that an anadromous fishery is also a sport fishery (e.g., salmon), there is overlap that should be recognized.

(4) 16 U.S.C. §1361 et seq., (the Marine Mammal Protection Act) and 16 U.S.C. §916 et seq., (the Whaling Convention Act) overlap to the extent they both regulate catching whales. 16 U.S.C. §1383 recognizes potential overlap and provides that the Marine Mammal Act is in addition to and not in contravention of any international convention, treaty or agreement, or statute implementing the same. This seems to mean that whalers are required to obtain two licenses and pay two fees before they may hunt whales--one is required under each act. It seems unnecessary to require two licenses and two fees to perform the same act, and if, in fact, only one license is required, the law should be clarified.

Here, as in other areas, there are some laws which should be amended to reflect the transfer of power from the Secretary of the Interior to the Secretary of Commerce. See, for example, 16 U.S.C. §§757a and b.

Congress may want to consider transferring from the Secretary of the Interior to the Secretary of Commerce those functions required under 16 U.S.C. §§661-664 (unclear whether transfer has been made), 16 U.S.C. §§760-2 thru 760-12, and 16 U.S.C. §1221 et seq. In each case, the transfer seems justified because the function to be transferred relates to fisheries to such an extent that it should properly vest in the authority in charge of fisheries--the Secretary of Commerce. One other transfer is appropriate for consideration: a transfer from the Secretary of the Interior to the Administrator of EPA of the obligation under 16 U.S.C. §757f to make recommendations concerning the elimination or reduction of polluting substances detrimental to fish and wildlife.

C. Coordinating the 1976 Act with other laws

There are a few instances where the 1976 Act could be better coordinated with other statutes:

(1) The Act should be coordinated with 16 U.S.C. §742(f), which directs the Secretary of Commerce to determine policies to carry out the laws relating to fish. He is directed to develop measures to assure maximum sustainable production of fish and to take steps to develop, advance, manage, conserve

and protect fisheries resources. Congress might want to consider amending this provision to recognize the "optimum sustainable yield" concept promoted by the 1976 Act and to coordinate it with the concept of regional councils and regional planning.

(2) As previously mentioned, 16 U.S.C. §760a, which directs the Secretary of Commerce to make certain Atlantic Coast studies on which to base his recommendations to the States for development and protection of Atlantic fisheries, might be amended to address itself in some way to the regional councils.

(3) 22 U.S.C. §2753(b), which prohibits foreign military sales for a period of one year to any country that seizes or fines an American fishing vessel for engaging in fishing more than 12 miles from the coast of that country, was not amended by the 1976 Act to reflect the 200-mile extended jurisdiction. Congress might want to consider amending this in some way because it seems incongruous to prohibit foreign fishing within 200 miles of our shores, while not recognizing similar territorial limits in other countries. Failure to amend this provision of law seems to have been an oversight.

D. Foreign relations

Several comments concerning statutes affecting foreign relations: (1) 19 U.S.C. §1323, allowing the President to raise duty rates up to 50 percent above the rate existing on July 1, 1934, could be obsolete if the rates today have already reached that point; if they have not, some adjustment of the base date might be warranted; (2) several sections, such as 22 U.S.C. §2753(b) and 22 U.S.C. §2370(o), provide for sanctions against foreign countries that seize U.S. fishing vessels in international waters. Congress might consider combining these and similar statutes into one law dealing with the subject; and (3) the inconsistency of 16 U.S.C. §2753(b) with the 200-mile limit established in the 1976 Act has already been discussed.

E. Domestic and foreign commerce

While several commerce-related statutes--16 U.S.C. §§772b, 781, 955c, 1171(a), for example--prohibit possession, sale, etc., of a described species, they do not specifically prohibit "importing" or "exporting" those species. If Congress intended these statutes to prohibit importing or exporting the named species, consideration should be given to clarifying them, at least when the conventions, agreements, or treaties are renegotiated. If importation and exportation were not intended to be prohibited, Congress might want to make that clear.

In the case of 16 U.S.C. §1100b-6, which restricts shrimping off the coast of Brizil, the statute does not appear to prohibit importing or otherwise trading or selling shrimp caught in violation of the law. In this regard, Congress might consider strengthening the law by prohibiting such activities.

Congress might also want to consider clarifying or strengthening 16 U.S.C. §§772b, 781, and 955(c) by specifically prohibiting sales or other commercial use of the species in question.

While 21 U.S.C. §§372a and 374 provide for fish inspection, it is not mandatory. Congress might want to consider making fish inspection mandatory in much the same way that it has imposed mandatory inspection upon certain phases of poultry and meat processing. See 21 U.S.C. §451 et seq. and 21 U.S.C. §601 et seq., respectively.

Under 15 U.S.C. §713c-2, the Secretary of Agriculture is to provide for the purchase and distribution of surplus fishery products. Under 15 U.S.C. §713c-3, the Secretary of the Interior is to promote the flow of domestically-produced fishery products. Congress may want to consider transferring one or both of these functions to the Secretary of Commerce; if it has already done so, the statute or statutes should be amended to reflect the transfer.

Section 205 of the 1976 Act and 22 U.S.C. §1978 overlap to the extent that section 205 encompasses the section 1978 restriction on fish imports from countries that do not cooperate in international fishery conservation. Congress might wish to consider amending section 1978.

F. Reporting requirements

Congress might want to consider consolidating, or at least summarizing in one single place, the reporting that is required (mandatory) of the Secretary of Commerce. In addition, section 742h, and possibly other sections, could be clarified by separating reports required of the Secretary of Commerce from those required of the Secretary of the Interior. This is another instance where the statute's failure to reflect the transfer of functions under Reorganization Plan No. 4 creates ambiguities.

G. Federal assistance

Federal statutes provide for various forms of assistance to benefit the U.S. fisheries. Direct financial assistance to the industry breaks down into three basic forms--subsidies (46 U.S.C. §1401 et seq.), loans (16 U.S.C. §742c), and loan guarantees (46 U.S.C. §1271 et seq.). The subsidy and loan programs

pertain only to fishing vessels, while the loan guarantee program is for the benefit of other vessels as well. Congress might want to consider an overall review of these direct assistance programs to consider the following questions:

(1) Should they all be within the same title of the United States Code? Presently, the loan program is under title 16 and the other two are under title 46.

(2) Should a separate loan guarantee program for fishing vessels be established?

(3) Should 46 U.S.C. §1401 et seq., (subsidies), administered by the Secretary of the Interior, be amended to be administered by the Secretary of Commerce? If the Reorganization Plan has already transferred this function, then the statute should be amended to reflect the transfer.

(4) Should the 1972 date beyond which applications for subsidies were not to be accepted, be extended again?

(5) Should the statutes spell out more precisely eligibility guidelines for each category of assistance? Under present law, no criteria are provided to guide the Secretary in determining that an applicant is not eligible for a loan, but is eligible for a loan guaranty.

H. Enforcement laws

The enforcement laws are consistent in selecting the Department of Commerce and the Coast Guard as the primary bodies to enforce the fishery laws. Certain arrest and seizure powers usually are granted by statute to the enforcing agency. Along with enforcement statutes, sanctions or penalties are prescribed, usually a fine and/or imprisonment. The maximum amounts of fines prescribed under older statutes may not be appropriate today due to inflation. For example, 16 U.S.C. §772e calls for a fine of not more than $1,000 for violation of the Northern Pacific Halibut Act of 1937. $1,000 today is certainly not equivalent to $1,000 in 1937 and it might be more appropriate to impose higher fines today. The fine for catching certain size sponges, up to $500 (16 U.S.C. §783), has not been changed since its enactment in 1914. In addition to considering amendment of these two provisions, Congress might want to consider amending the following statutes because the fines they authorize may also be outdated: 16 U.S.C. §§666a, 772f, 776c, 853, 916e and f, 989, and 46 U.S.C. §319.

APPENDIX II

DETAILED COMPILATION AND ANALYSIS

I. INTRODUCTION

Federal laws that significantly affect the U.S. high-seas fishing industry are many and varied, scattered throughout several titles of the United States Code. The purpose of this document is to compile and analyze these fisheries-related laws (excluding fish farming laws) to determine areas where Congress could consider amendments. This study organizes fisheries-related laws into categories and examines them for conflicts, inconsistencies, overlaps, repetitions and other factors that demonstrate a need for amendment. The laws are broken down into three major categories: (1) management and regulation of fisheries; (2) Federal assistance; and (3) enforcement and sanctions. Each of these categories is subdivided to facilitate careful examination and analysis of the laws. The findings are summarized in the pages that follow.

The multitude of laws affecting the fishing industry is administered by several Federal departments and agencies. The departments most significantly involved in administering fisheries-related laws are the Department of Commerce, the Department of the Interior, the Department of State, and the Department of Transportation. The agencies within these departments that play key roles include the National Oceanic and Atmospheric Administration (NOAA) (Department of Commerce), the National Marine Fisheries Service (NMFS) within NOAA, the U.S. Fish and Wildlife Service (Department of the Interior), and the Coast Guard (Department of Transportation). Other Federal departments and agencies involved in administering laws that affect the fishing industry include the Department of Agriculture, the Food and Drug Administration, the Internal Revenue Service, the Small Business Administration, and the Department of Labor.

The laws administered by these departments and agencies range from those designed to protect the fish to those designed to protect the fisherman, the declared policy apparently being to promote and protect the fishing industry. The declared policy of Congress has variously been stated as: "* * * to foster, promote, and develop the * * * fishery industries * * * of the United States; * * *" (§3 of P.L. 57-552, an Act establishing the Department of Commerce and Labor (1903), 15 U.S.C. §1512); "* * * to provide for the * * * development of the high seas fishing industry of the United States * * *" (§1 of P.L. 80-329,

(1947), 16 U.S.C. §758); to satisfy certain fundamental needs of the fishing industry--freedom of enterprise, protection of opportunity, and assistance to the industry, among others and to administer the Fish and Wildlife Act of 1956 with the intent of "stimulating the development of a strong, prosperous, and thriving fishery and fish processing industry" (§3 of the Fish and Wildlife Act of 1956, 16 U.S.C. §742a); "to promote domestic, commercial and recreational fishing under sound conservation and management principles" (§2(b)(5) of P.L. 94-265, Fishery Conservation and Management Act of 1976).

The progression of legislation from 1903 to the present indicates a subtle change in the Nation's stated policy from one of fostering and promoting the fishing industry in 1903 (P.L. 57-552) implying growth and expansion, to the more recent policy of developing and protecting the industry (Fish and Wildlife Act of 1956), and "that our fishing industry be afforded all support necessary to have it strengthened" (Eastland Resolution), implying preventing deterioration of the industry and the more effective use of the existing industry. In the Fishery Conservation and Management Act of 1976 (P.L. 94-265), Congress' declared purpose is a return to promotion (growth) of the industry. If the perceived change is unintentional, perhaps Congress should clarify the fishery policy. The declared policy of the nation with regard to the fishing industry is important because it impacts on the interpretation and implementation of laws affecting the industry.

The many Federal laws notwithstanding, the States have significant impact on the fishing industry vis-a-vis their own laws. With few exceptions, the seaward boundary of each coastal state is three miles distant from its coast line (§4 of the Submerged Lands Act, 43 U.S.C. §1312). Within these waters the States have, according to section 3 of the Submerged Lands Act:

> "* * *(1) title to and ownership of the lands beneath [these] waters * * *, and the natural resources within such lands and waters, and (2) the right and power to manage, administer, lease, develop, and use the said lands and natural resources all in accordance with applicable State law * * *."

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The Fishery Conservation and Management Act of 1976 (the 1976 Act), neither diminishes nor extends the jurisdiction or authority of any State within its boundaries, except where the fishing in a fishery takes place predominately within and beyond the fishery conservation zone, and a State takes any action, or fails to take any action, the results of which will substantially and adversely affect the carrying out of a fishery management plan (§306(b)). In such a case, the Federal Government may regulate fishing within State territorial waters.

The United States has jurisdiction, beginning March 1 , 1977, to manage fisheries beyond State boundaries up to 200 miles out from the coastline. Sections 101 and 102 of the Act of 1976 establish a "fishery conservation zone" between 3 and 200 miles out to sea, over which the United States is granted exclusive fishery management authority. Until the 1976 Act takes effect on March 1, 1977, U.S. jurisdiction over fisheries will extend to its present outer boundary of nine miles from the outer boundary of the States (generally 12 miles from the coast). 16 U.S.C. §§1091-1094.

II. MANAGEMENT AND REGULATION OF FISHERIES

The most significant and greatest number of fisheries-related laws concern management or regulation of fisheries. The Nation's fisheries are managed by protection of the resource through laws regulating such matters as research and conservation and regulation of domestic and foreign fishing. The industry is protected by laws regulating such areas as commerce and labor.

Management of the fisheries is mainly in the hands of the Secretary of Commerce, who administers such laws as the Fish and Wildlife Act of 1956 and who will be administering the 1976 Act. Until formation of NOAA under Reorganization Plan No. 4 of 1970 (Reorganization Plan), 84 Stat. 2090, most fishery management laws were administered by the Bureau of Commercial Fisheries of the United States Fish and Wildlife Service, Department of the Interior.

The Reorganization Plan contemplated the establishment of a single unit within the Department of Commerce which would focus, manage, and regulate developmental, operational and environmental aspects of coastal zone management. The Plan therefore transferred just about all functions of the Bureau of Commercial

Fisheries and all functions of the Secretary of the Interior that previously were administered by the Bureau to the Secretary of Commerce. Four specific exceptions were made for interior waters that remained under the auspices of the Department of the Interior: Great Lakes fishery research, Missouri River research, research relating to the Gulf Breeze Biological Laboratory, and matters concerning the trans-Alaska pipeline investigations.

The Secretary of Commerce was also given those responsibilities relating to migratory marine species of game fish. 16 U.S.C. §760e-760g. Along the same lines, Marine Resource Development Programs previously carried out under the direction of the National Science Foundation were also transferred to NOAA, under the direction of the Secretary of Commerce. 33 U.S.C. §1121 et seq.

One difficult problem in the administration and control area is ascertaining whether certain statutes are to be administered by the Secretary of Commerce or the Secretary of the Interior. Very few provisions of the United States Code have been amended to reflect the transfer of functions beyond the addition of a footnote to the section itself. The body of law still reads that the authority is in the Secretary of the Interior. As a result, it is often difficult to determine from the statute alone, and in some cases even by reference to the Reorganization Plan itself, whether the Secretary of Commerce or the Secretary of the Interior is responsible for administration of the statutory duties.

Two examples in particular point out this problem. 16 U.S.C. §742e (§6 of the Fish and Wildlife Act of 1956) provides:

> "There shall be transferred to the Secretary [of Interior] all functions of the Secretary of Agriculture, the Secretary of Commerce, and the head of any other Department or agency, as determined by the director of the Office of Management and Budget to relate primarily to the development, advancement, management, conservation and protection of commercial fisheries; * * *"

Only in the historical note at the end of the provision is it stated that these powers have now been transferred to the Secretary of Commerce.

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In 16 U.S.C. §742d(5) the Secretary of the Interior is directed to collect statistics on the nature and availability of wildlife. It is unclear whether the Secretary of Commerce might be authorized by this section to collect certain statistics. Although most of the research called for by section 742d appears to be the responsibility of the Secretary of Commerce because of the transfer of powers, the statute makes reference only to the Secretary of the Interior.

Statutes that do not reflect the transfer of functions to the Secretary of Commerce by the Reorganization Plan include the following:

16 U.S.C. §662	16 U.S.C. §760-2 thru 760-12
16 U.S.C. §663	16 U.S.C. §777 et seq.
16 U.S.C. §664	16 U.S.C. §1221 et seq.
16 U.S.C. §665	16 U.S.C. §1531 et seq.
16 U.S.C. §757a, b, f	16 U.S.C. §772d

Several sections appropriately specify the Secretary of Commerce, and serve as an example:

16 U.S.C. §755	16 U.S.C. §785
16 U.S.C. §756	16 U.S.C. §1201 et seq.
16 U.S.C. §760e-760g	16 U.S.C. §1361
16 U.S.C. §760d	16 U.S.C. §1431 et seq.
16 U.S.C. §1381	16 U.S.C. §772 et seq.

A. Conservation

Since the fishing industry could not exist without its main resource--fish, it is of utmost importance that the resource be protected from depletion. Laws protecting the resource from depletion can be broken down into two categories: (1) research and related activities, such as investigations and experiments, designed to protect the resource; and (2) conservation measures. The Secretary of Commerce is directed to do research or research-related work as follows:

(1) 16 U.S.C. §742d--directs the Secretary to conduct continuing investigations in the following: production and flow to market of fish and fishery products; availability and abundance and the biological requirements of fish resources; competitive economic position of fish and fishery products;

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statistics on commercial and sport fishing; improvement of production and marketing practice in regard to commercial species and the conduct of educational and extension services relative to commercial and sport fishing; and any other matters related to fish operations deemed by the Secretary to be of public interest.

(2) 16 U.S.C. §744--directs the Secretary to conduct investigations and experiments relating to damage to fisheries by dogfish and other predacious fishes and aquatic animals with a view toward improving the situation and utilizing the predators.

(3) 16 U.S.C. §756--directs the Secretary to conduct investigations and experiments necessary to direct and facilitate conservation of fishery resources of the Columbia River and its tributaries.

(4) 16 U.S.C. §758a--directs the Secretary to conduct fishing explorations and such necessary related work as oceanographical, biological and economic studies to insure maximum development and utilization of the high seas fishery resources of the United States and its island possessions in the tropical and subtropical Pacific Ocean and intervening areas.

(5) 16 U.S.C. §760a--directs the Secretary to undertake a comprehensive study of species of fish in the Atlantic Coast area for the purpose of recommending appropriate measures, such as season, catch, and gear limitations, for the development and protection of such resources and their wisest utilization.

(6) 16 U.S.C. §760e--directs the Secretary to undertake a comprehensive continuing study of migratory marine fish of interest to recreational fishermen, including growth rates, mortality rates and environmental influences in order to develop conservation policies and management activities.

(7) 16 U.S.C. §1381--directs the Secretary to undertake a research program for the improvement of fishing methods and gear so as to reduce the incidental taking of marine mammals in connection with commercial fishing.

(8) 33 U.S.C. §1441--directs the Secretary, in coordination with the Secretary of Transportation, to initiate a comprehensive and continuing program of research on effects of dumping material into ocean waters or other coastal waters.

(9) 33 U.S.C. §1442--directs the Secretary, in consultation with other appropriate Federal authorities, to initiate a comprehensive and continuing program of research with respect to the possible long range effects of pollution, overfishing and man-induced changes of ocean ecosystems.

(10) Section 304(e) of the 1976 Act provides:

> "The Secretary shall initiate and maintain a comprehensive program of fishery research to carry out and further the purposes, policy, and provisions of this Act. Such program shall be designed to acquire knowledge and information, including statistics, on fishery conservation and management, including, but not limited to, biological research concerning the interdependence of fisheries or stocks of fish, the impact of pollution on fish, the impact of wetland and estuarine degradation, and other matters bearing upon the abundance and availability of fish."

In addition to the above mandated authority, the Secretary of Commerce has discretionary authority to conduct research or research-related activities as follows:

(1) 16 U.S.C. §661--authorizes the Secretary to make surveys and investigations of the fish in the public domain.

(2) 16 U.S.C. §757b--authorizes the Secretary to conduct investigations and research "as may be desirable" to carry out programs pursuant to cooperative agreements with States for the purpose of conserving and developing anadromous fishery resources that are subject to depletion.

(3) 16 U.S.C. §1202--authorizes the Secretary to conduct investigations and research, "as he deems necessary," of jellyfish with a view toward controlling or eliminating them.

In addition to statutes providing for research by the Secretary of Commerce, statutes also provide for research by others. For example, the Secretary of the Interior is authorized to make such investigations "as he deems necessary" to determine the effects of polluting substances on wildlife (16 U.S.C. §665), and is directed to conduct a study and inventory of the Nation's

estuaries considering, among other things, their value to marine, anadromous and shell fisheries. 16 U.S.C. §1222. In addition, research by other Federal authorities is provided for as follows:

(1) The Coast Guard is directed to conduct such oceanographic research as may be in the national interest, 14 U.S.C. §94.

(2) The Administrator of the Environmental Protection Agency is directed to study the effects of different chemicals (e.g. insecticides) on fish and wildlife, 16 U.S.C. §742d-1.

(3) The Commission on Marine Science, Engineering, and Resources, is directed to study all aspects of marine science in order to recommend an overall plan for an adequate national oceanographic program, 33 U.S.C. §104.

(4) The National Science Foundation is directed to initiate and support necessary research programs in the various fields relating to development of marine resources, 33 U.S.C. §1123(b).

There are several instances in which the above enumerated statutes are inconsistent or overlap with each other. For example: 16 U.S.C. §742d(4) and 16 U.S.C. §760e seem to overlap somewhat since both deal with statistics related to sport fishing. They could be combined into one statute dealing with sport fishing statistics and research.

Methods and gear determined under section 1381 of Title 16 to be desirable to reduce incidental taking of marine mammals are different from gear limitations determined under 16 U.S.C. §760a to be desirable. To this extent they are inconsistent and should refer to each other so that research called for under each is conducted with consideration given to research called for by the other; e.g., research on gear limitations to protect marine mammals under section 1381 should take into consideration gear limitations that would serve the purpose of developing and protecting species as called for by section 760a.

16 U.S.C. §744 and 16 U.S.C. §1202 both deal with problem species (species that pose a threat to other species, to man, or to both) and might be combined into one provision under which research could remain separate or could be combined.

14 U.S.C. §94 and 16 U.S.C. §758a overlap to the extent that the Coast Guard might do oceanographic research related

to fisheries. Perhaps section 94 should be amended to preclude the Coast Guard from doing any research related to fisheries that the Secretary of Commerce is authorized to pursue. The Commission on Marine Science, Engineering, and Resources is also directed to do oceanographic research under 33 U.S.C. §1104.

Several statutes--16 U.S.C. §§742d-1 and 665 and 33 U.S.C. §§1441 and 1442--overlap in dealing with research on the effects of pollution and other environmental factors on fish. It might be appropriate to combine these into one statute providing for one or more research programs to be conducted by the Administrator of EPA.

Section 304(e) of the 1976 Act encompasses several other research statutes--16 U.S.C. §§742d, 744, 758a and 33 U.S.C. §§1441, 1442. Section 304(e) might be a good place in which to centralize research laws.

In addition to overlaps and inconsistencies, the problem of determining whether a statute is to be administered by the Secretary of Commerce or by the Secretary of the Interior exists among research statutes. For example, 16 U.S.C. §742d(5), directs the Secretary of the Interior to collect statistics on the nature and availability of wildlife and it is not clear whether the Secretary of Commerce may be authorized by this section to collect certain statistics. Although most of the research called for by section 742d appears, under the Reorganization Plan, to be the responsibility of the Secretary of Commerce, the statute makes reference only to the Secretary of Interior.

Another problem area, alluded to above, has resulted from the relatively recent enactment of the Fish Conservation and Management Act of 1976. The problem is to properly coordinate existing laws with the 1976 Act. Section 760a of Title 16, which provides for certain studies to recommend to the States measures to be taken to protect and develop fish resources, could be coordinated with the 1976 Act by amending it to refer to the appropriate regional councils. These problems will be discussed more generally below.

Congress might want to consider reorganization and recodification of the research laws, clearly setting out duties and powers.

The second category of statutes dealing with protection of the resource is conservation. Conservation statutes include

APPENDIX II

those which prohibit, restrict or limit fishing in some way, those aimed at improving the environment as a conservation measure and other conservation measures. Conservation which involves international treaties or conventions will be covered separately.

Conservation statutes are many and varied. The more significant ones are:

(1) 16 U.S.C. §§661-664--provides for conservation, maintenance, and management of wildlife (includes fish) resources by providing that whenever any Government authority or anyone with Government permission plans to modify any body of water, such as by impounding, diverting or deepening it, such authority must consult with the U.S. Fish and Wildlife Service, Department of the Interior, and with the appropriate State authority, with a view toward conservation of wildlife resources by preventing loss of and damage to such resources, as well as providing for the development and improvement thereof in connection with such water-resource development. It is not clear whether any transfer of function to the Secretary of Commerce has occurred here; if it has not, Congress might want to consider it.

(2) 16 U.S.C. §667b--provides that real property under the jurisdiction or control of a Federal agency and no longer required by such agency may be utilized for wildlife conservation purposes.

(3) 16 U.S.C. §755--directs the Secretary of Commerce to establish salmon-cultural stations in the Columbia River Basin, to improve feeding and spawning conditions, and to perform all other activities necessary for the conservation of fish in the Columbia River Basin.

(4) 16 U.S.C. §§757a and b--authorizes the Secretary of the Interior (appears to have been transferred to the Secretary of Commerce) to enter into cooperative agreements with States to take action to conserve, develop, and enhance the anadromous and Great Lakes fisheries.

(5) 16 U.S.C. §757f--directs the Secretary of the Interior (or Commerce?) to make recommendations, based on certain studies, to the Secretary of Health, Education and Welfare, concerning the elimination or reduction of polluting substances detrimental

to fish and wildlife in interstate or navigable waters. Congress might want to consider transferring this function to the Administrator of EPA.

(6) 16 U.S.C. §§760-2 thru 760-12--authorizes, and in some cases directs, the Secretary of the Interior to establish and maintain certain hatcheries in certain States. Congress might want to consider transferring this function to the Secretary of the Interior.

(7) 16 U.S.C. §777 et seq.--directs the Secretary of the Interior to cooperate with the States in projects designed for the restoration and management of all species of fish which have material value in connection with sport or recreation.

(8) 16 U.S.C. §§781-785--regulates landing, curing, and sale of sponges taken from Gulf of Mexico and Straits of Florida and establishes minimum size of sponges that may be taken.

(9) 16 U.S.C. §1201 et seq.--directs the Secretary of Commerce to carry out a program to control and eliminate jellyfish to promote the fish and shellfish resources in U.S. coastal waters and to promote and safeguard water-based recreation in those waters.

(10) 16 U.S.C. §§1211-1213--provides for study and control of "Crown of Thorns" starfish in the tropics of interest and concern to the U.S. to conserve and protect coral reef resources in the tropics.

(11) 16 U.S.C. §1221 et seq.--directs the Secretary of the Interior to coordinate with the States to provide for protection, conservation, and restoration of resources of the estuaries in the United States. To the extent fisheries are affected, Congress might want to consider transferring this function to the Secretary of Commerce.

(12) 16 U.S.C. §1361 et seq.--provides for conservation and protection of marine mammals through strict regulation of and restriction on catching marine mammals (administered by the Secretary of Commerce).

(13) 16 U.S.C. §1431 et seq.--authorizes the Secretary of Commerce to designate as marine sanctuaries those ocean waters

as far seaward as the outer edge of the Continental Shelf, as he determines necessary, to preserve or restore such areas for conservation, recreation, ecology, or esthetic value.

(14) 16 U.S.C. §1531 et seq.--provides for conservation and protection of endangered species.

(15) Sections 301-305 of the 1976 Act--provide for formulation and implementation of conservation and management plans based on national standards established in section 301.

In addition to the above conservation-related statutes, there are conservation statutes that implement international conventions:

(1) 16 U.S.C. §772a et seq., International Pacific Halibut Commission--regulates catching of halibut in the northern Pacific Ocean and other waters.

(2) 16 U.S.C. §776 et seq., International Pacific Salmon Fisheries Commission--regulates catching of sockeye salmon and pink salmon in certain waters of the Pacific Ocean.

(3) 16 U.S.C. §916 et seq., International Whaling Commission --regulates catching of whales.

(4) 16 U.S.C. §931 et seq., Great Lakes Fishery Commission--regulates Great Lakes fisheries.

(5) 16 U.S.C. §951 et seq., Inter-American Tropical Tuna Commission and the International Commission for the Scientific Investigation of Tuna--regulates tuna fishing in the tropics.

(6) 16 U.S.C. §971 et seq., International Commission for the Conservation of Atlantic Tunas--regulates tuna fishing in the Atlantic.

(7) 16 U.S.C. §981 et seq., International Commission for the Northwest Atlantic Fisheries--regulates fishing in the northwest Atlantic Ocean.

(8) 16 U.S.C. §1021 et seq., International North Pacific Fisheries Commission--regulates fishing in the North Pacific Ocean.

(9) 16 U.S.C. §1100b et seq.--implements shrimp fishing treaty between U.S. and Brazil; regulates shrimp fishing carried on in the vicinity of Brazil.

(10) 16 U.S.C. §1151 et seq., North Pacific Fur Seal Commission--regulates taking of fur seals in the North Pacific Ocean.

While there does not appear to be much inconsistency or overlapping among the conservation-related laws, a few should be mentioned:

(1) 16 U.S.C. §755 and 16 U.S.C. §1221 et seq., overlap to the extent that section 755 makes for the Columbia River Basin the specific provision that section 1221 makes generally applicable to the Nation's entire estuary system.

(2) 16 U.S.C. §§757a and b authorize the Secretary of the Interior (apparently transferred to Commerce), in cooperation with the States, to undertake conservation measures with regard to anadromous fisheries, while 16 U.S.C. §1221 et seq., directs the Secretary of the Interior, in cooperation with the States, to take conservation measures with regard to resources in the estuaries of the U.S. Since anadromous fisheries are present in some U.S. estuaries, management functions potentially overlap between the Secretaries of Commerce and Interior. Congress might want to reconcile this by qualifying 16 U.S.C. §1221 et seq. to exclude regulation of anadromous fisheries, thus consolidating the functions in the Secretary of Commerce. It has already been suggested that Congress might want to consider transferring management of the estuaries, to the extent it affects fisheries, to the Secretary of Commerce.

(3) 16 U.S.C. §§757a and b and 16 U.S.C. §1221 et seq., also overlap with 16 U.S.C. §777 et seq., which directs the Secretary of the Interior, in cooperation with the States, to restore and manage sport fisheries. To the extent that an anadromous fishery is also a sport fishery (e.g., salmon), there is overlap that should be recognized.

(4) 16 U.S.C. §1361 et seq., (the Marine Mammal Protection Act) and 16 U.S.C. §916 et seq., (the Whaling Convention Act) overlap to the extent they both regulate catching whales. 16 U.S.C. §1383 recognizes potential overlap and provides that

the Marine Mammal Act is in addition to and not in contravention of any international convention, treaty or agreement, or statute implementing the same. This seems to mean that whalers are required to obtain two licenses and pay two fees before they may hunt whales--one is required under each act. It seems unnecessary to require two licenses and two fees to perform the same act, and if, in fact, only one license is required, the law should be clarified.

Here, as in other areas, there are some laws which should be amended to reflect the transfer of power from the Secretary of the Interior to the Secretary of Commerce. See, for example, 16 U.S.C. §§757a and b.

As pointed out earlier, Congress may want to consider transferring from the Secretary of the Interior to the Secretary of Commerce those functions required under 16 U.S.C. §§661-664 (unclear whether transfer has been made), 16 U.S.C. §§760-2 thru 760-12, and 16 U.S.C. §1221 et seq. In each case, the transfer seems justified because the function to be transferred relates to fisheries to such an extent that it should properly vest in the authority in charge of fisheries--the Secretary of Commerce. One other transfer is appropriate for consideration: transfer from the Secretary of the Interior to the Administrator of EPA the obligation under 16 U.S.C. §757f to make recommendations concerning the elimination or reduction of polluting substances detrimental to fish and wildlife.

B. Management Under the Fishery Conservation and Management Act of 1976

The recently enacted Fishery Conservation and Management Act of 1976 goes beyond merely providing for conservation of resources. Until passage of the 1976 Act there appeared to be no overall management plan in the U.S. laws for U.S. fisheries. This Act, however, establishes a comprehensive plan for managing the fisheries. Title I establishes management authority of the United States within a "fishery conservation zone" that extends 200 miles seaward from the coastline; Title II provides for foreign fishing under certain conditions; and Title III establishes a national fishery management program for the conservation and management of fishery resources subject to exclusive U.S. fishery management authority.

Title III establishes national standards for fishery conservation and management to be applied by new Regional Fishery Management Councils and by the Secretary of Commerce in the preparation of fishery management plans and regulations. The Secretary of Commerce is directed to establish guidelines, based on the national standards, to assist in the development of fishery management plans.

The Act provides for eight Regional Fishery Management Councils, each representing a different geographic coastal area of the country. Each Council is directed to prepare a fishery management plan for each fishery within its geographic jurisdiction to cover any fish over which the United States exercises exclusive fishery management authority. Each plan must require the submission of catch statistics and other pertinent data to the Secretary of Commerce. Also, each plan is to (1) specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery involved, and (2) assess and specify the capacity and extent to which U.S. fishery vessels will harvest such optimum yield and the portion which can be made available for foreign fishing.

The Secretary of Commerce is to review each fishery management plan to determine whether it is consistent with the national standards for fishery conservation and management, the other provisions and requirements of the 1976 Act, and any other applicable law. After the Secretary approves a Council-prepared plan or, if one is not prepared, himself prepares a plan, the Secretary shall implement the plan.

There are a few instances where the 1976 Act might be better coordinated with other statutes:

(1) The Act should be coordinated with 16 U.S.C. §742(f), which directs the Secretary of Commerce to determine policies to carry out the laws relating to fish. He is directed to develop measures to assure maximum sustainable production of fish and to take steps to develop, advance, manage, conserve and protect fisheries resources. Congress might want to consider amending this provision to recognize the "optimum sustainable yield" concept promoted by the 1976 Act and to coordinate it with the concept of regional councils and regional planning.

(2) As previously mentioned, 16 U.S.C. §760a, which directs the Secretary of Commerce to make certain Atlantic Coast studies,

on which to base his recommendations to the States for development and protection of Atlantic fisheries, might be amended to address itself in some way to the regional councils.

(3) 22 U.S.C. §2753(b), which prohibits foreign military sales for a period of one year to any country that seizes or fines an American fishing vessel for engaging in fishing more than 12 miles from the coast of that country, was not amended by the 1976 Act to reflect the 200-mile extended jurisdiction. Congress might want to consider amending this in some way because it seems incongruous to prohibit foreign fishing within 200 miles of our shores, while not recognizing similar territorial limits in other countries. Failure to amend this provision of law seems to have been an oversight.

C. Foreign Relations

The large number of international (bilateral and multilateral) treaties, conventions, and agreements regarding fisheries serves to indicate that fishery laws cannot be written without recognizing and dealing with the rights of other countries. U.S. laws that affect our foreign relations include:

(1) 16 U.S.C. §742g--provides for the Secretary of State to cooperate and consult with the Secretary of Commerce and others concerning matters of foreign affairs that affect fish products.

(2) 16 U.S.C. §§1081-1086--deals with the prohibition of foreign fishing vessels in territorial waters of the United States, but is repealed by 1976 Act.

(3) 16 U.S. §§1091-1094--establishes fisheries zones contiguous to the territorial sea of the United States, that is, 12-mile jurisdiction, but is repealed by 1976 Act.

(4) 16 U.S.C. §§1100-1100a-3--prohibits the use of certain small vessels in U.S. fisheries: until October 27, 1977, any vessel constructed in a foreign country, used in a fishery of such foreign country, and subsequently prohibited by such foreign country from being used in such fishery, is prohibited from being used in the same fishery in the United States.

(5) 16 U.S.C. §1378--directs the Secretary of Commerce, (and in some cases the Secretary of the Interior) through the Secretary

of State, to enter international agreements to protect marine mammals, and to take other measures to promote an international program to protect marine mammals.

(6) 16 U.S.C. §1538(c)--makes unlawful the violation of any provision of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

(7) 19 U.S.C. §1323--grants the President authority to increase the duty rate, not to exceed 50 percent above the rate existing on July 1, 1934, on any fish that are the product of a country that refuses to engage in negotiations relating to use or conservation of fishery resources.

(8) 22 U.S.C. §§1971-1979--authorizes the Secretary of State to take appropriate action to protect U.S. vessels seized by foreign countries and provides for reimbursement to vessel owners for losses sustained as a result of the seizure.

(9) 22 U.S.C. §2753(b)--prohibits foreign sales for a period of one year to any country that seizes or fines an American fishing vessel for fishing more than 12 miles from the coast of that country.

(10) 22 U.S.C. §2370(o)--provides for possible exclusion from certain foreign assistance for countries that seize or impose any penalty or sanction against any U.S. fishing vessel on account of its fishing activities in international waters.

(11) 33 U.S.C. §1442(b)--grants the Secretary of Commerce authority to act in conjunction with other countries in carrying out a research program (under section 1442) on long-range effects of pollution, overfishing, and man-induced changes of ocean ecosystems.

(12) 46 U.S.C. §251--prohibits foreign vessels from landing their fish catch in the United States.

(13) 46 U.S.C. §§310 and 311--require that the owner of any U.S. fishing vessel who intends to touch and trade at any foreign port must obtain permission from the Government to do so before departing.

(14) Sections 201-204 of the 1976 Act--regulate foreign fishing within 200 miles of the coastline of the United States

and direct the Secretary of State to renegotiate existing treaties that affect fishing in the fishery conservation zone.

Several comments concerning certain of these statutes: (1) 19 U.S.C. §1323, allowing the President to raise duty rates up to 50 percent above the rate existing on July 1, 1934, could be obsolete if the rates today have already reached that point; if they have not, some adjustment of the base date might be warranted; (2) several sections, such as 22 U.S.C. §2753(b) and 22 U.S.C. §2370(o), provide for sanctions against foreign countries that seize U.S. fishing vessels in international waters. Congress might consider combining these and similar statutes into one law dealing with the subject; and (3) the inconsistency of 16 U.S.C. §2753(b) with the 200-mile limit established in the 1976 Act has already been discussed.

In addition to the above statutes, import limitation statutes and other commercial statutes, to be discussed below, also affect foreign relations.

D. Laws Regulating the Industry

Since the fishing industry operates in interstate and foreign commerce, it is subject to Federal regulation. The main areas of Federal regulation are (1) domestic and foreign commercial activities, (2) labor, and (3) vessels. For the most part, the Department of Commerce administers laws regulating commercial fishing activities. It is the duty of the Department of Commerce "to foster, promote, and develop the * * * fishery industries * * *."

1. Regulation of the fishing industry in domestic and foreign commerce

(1) 16 U.S.C. §772(b)--restricts halibut imports.

(2) 16 U.S.C. §776a(b)--restricts importing and exporting Pacific salmon.

(3) 16 U.S.C. §781--apparently makes it unlawful to import or export sponges less than five inches in diameter that are caught outside State waters in the Gulf of Mexico or in the Straits of Florida.

(4) 16 U.S.C. §§851-856--restricts transporting black bass in interstate or foreign commerce.

(5) 16 U.S.C. §916c(a)--restricts importing and exporting whales.

(6) 16 U.S.C. §955(c)--calls for regulations restricting importing and exporting tropical tuna.

(7) 16 U.S.C. §971e(a)(2)--restricts importing and exporting Atlantic tuna.

(8) 16 U.S.C. §988(a)--restricts importing and exporting fish of the Northwest Atlantic fisheries.

(9) 16 U.S.C. §1029(a)--restricts importing and exporting fish of the North Pacific fisheries.

(10) 16 U.S.C. §1100b-6--restricts transshipping shrimp off the coast of Brazil.

(11) 16 U.S.C. §1171(a)--appears to restrict importing and exporting sea otters.

(12) 16 U.S.C. §1371 et seq.--restricts importing marine mammals.

(13) 16 U.S.C. §1538--prohibits importing or exporting endangered species of fish or wildlife; further prohibits delivering, receiving, carrying, transporting, shipping, or selling or offering to sell any such species in interstate or foreign commerce.

(14) 22 U.S.C. §1978--restricts importing fishery products from countries that do not cooperate in international fishery conservation.

(15) §205 of the 1976 Act--restricts importing fish and fish products from countries that do not cooperate in international fishery agreements.

In addition to statutes regulating foreign commerce, the following statutes regulate domestic commerce:

(1) 16 U.S.C. §772b(f)--restricts use of Northern Pacific halibut.

(2) 16 U.S.C. §776a(b)--restricts use of Pacific salmon in interstate commerce.

(3) 16 U.S.C. §781--prohibits sale of commercial sponges less than five inches in diameter.

(4) 16 U.S.C. §§851-856--restricts transporting black bass in interstate or foreign commerce.

(5) 16 U.S.C. §916c(a)--restricts sales of whales and whale products.

(6) 16 U.S.C. §971e(a)(2)--restricts sale of Atlantic tuna.

(7) 16 U.S.C. §988(a)--restricts sale of fish of Northwest Atlantic fisheries.

(8) 16 U.S.C. §1029(a)--restricts sale of fish of North Pacific fisheries.

(9) 16 U.S.C. §1171(a)--restricts sale of sea otters.

(10) 16 U.S.C. §1372(a)(3) and (4)--restricts sale and other commercial use of marine mammals.

(11) 16 U.S.C. §1538--restricts sale and other commercial use of endangered species.

(12) 7 U.S.C. §1621 et seq.--regulates marketing of agricultural products, which includes fish produced through agriculture.

(13) 15 U.S.C. §§521 and 522--authorize persons engaged in the fishing industry to act together in associations in collectively catching, producing, preparing for market, processing, handling and marketing their products in interstate and foreign commerce, so long as such association does not monopolize or restrain trade in interstate or foreign commerce.

(14) 15 U.S.C. §§713c-2 and 3--provide for purchase and distribution of surplus fishery products by the Secretary of Agriculture and promotion by the Secretary of the Interior of free flow of domestically produced fishery products.

(15) 21 U.S.C. §301 et seq. --regulates sanitary conditions in the food (including fish) industry.

(16) 21 U.S.C. §372a--provides for voluntary inspection of sea food upon request of any sea food packer.

(17) 21 U.S.C. §374--authorizes the Secretary of HEW to inspect establishments that manufacture, process, pack, or hold for introduction into interstate commerce, any food (including fish) products.

The word "restricts" as used in the above listing of statutes means that it is unlawful to carry on the activity specified (e.g., importing, selling, etc.) except as delineated in the relevant statute; at the very least, the statute usually requires a permit.

While several of the above statutes--16 U.S.C. §§781, 772b, 955c, 1171(a), for example--prohibit possession, sale, etc., of the described species, they do not specifically prohibit "importing" or "exporting" those species. If Congress intended these statutes to prohibit importing or exporting the named species, consideration should be given to clarifying them, at least when the conventions, agreements, or treaties are renegotiated. If importation and exportation were not intended to be prohibited, Congress might want to make that clear.

In the case of 16 U.S.C. §1100b-6, which restricts shrimping off the coast of Brazil, the statute does not appear to prohibit importing or otherwise trading or selling shrimp caught in violation of the law. In this regard, Congress might consider strengthening the law by prohibiting such activities.

Congress might also want to consider clarifying or strengthening 16 U.S.C. §§772b, 781, and 955(c) by specifically prohibiting sales or other commercial use of the species in question.

While 21 U.S.C. §§372a and 374 provide for fish inspection, it is not mandatory. Congress might want to consider making fish

inspection mandatory in much the same way that it has imposed mandatory inspection upon certain phases of poultry and meat processing. See 21 U.S.C. §451 et seq. and 21 U.S.C. §601 et seq., respectively.

Under 15 U.S.C. §713c-2, the Secretary of Agriculture is to provide for the purchase and distribution of surplus fishery products. Under 15 U.S.C. §713c-3, the Secretary of the Interior is to promote the flow of domestically-produced fishery products. Congress may want to consider transferring one or both of these functions to the Secretary of Commerce; if it has already done so, the statute or statutes should be amended to reflect the transfer.

Section 205 of the 1976 Act and 22 U.S.C. §1978 overlap to the extent that section 205 encompasses the section 1978 restriction on fish imports from countries that do not cooperate in international fishery conservation. Congress might wish to consider amending section 1978.

2. Laws regulating labor in the fishing industry

(1) 29 U.S.C. §213(a)(5)--fishermen and other people employed in other facets of the fishing industry are exempt from coverage of the minimum wage and maximum hour provision of the Fair Labor Standards Act.

(2) 46 U.S.C. §§531-533--regulates employment during fishing voyages, requiring written agreement for certain voyages.

(3) 46 U.S.C. §601--protects wages of fishermen from garnishment.

(4) 46 U.S.C. §688--provides remedy for fishermen injured on fishing vessels and guarantees right to jury trial.

(5) 46 U.S.C. §761--provides remedy for wrongful death on high seas.

3. Regulation of vessels

Title 46 of the United States Code, which deals with shipping, provides for such matters as registration, enrollment, licensing, and inspection of U.S. vessels. Not all provisions apply to

fishing vessels. For example, section 367 exempts fishing vessels from laws governing inspection of steam vessels. Many of the laws that regulate vessels have been enacted for the benefit and protection of U.S. vessels, including fishing vessels. Section 251, for example, provides that only enrolled U.S. vessels are entitled to the privileges of vessels employed in the coasting trade or fisheries, and except as otherwise provided by treaty or convention, no foreign vessel may land its catch in the United States. The abbreviated study made of this area showed no inconsistencies or overlaps in laws affecting vessels employed in the fishing industry.

E. Reporting Requirements

There are several areas where the Secretary of Commerce is authorized or directed to take certain action relative to the U.S. fisheries and then report progress made in that area to the Congress, the President or to some other party.

(1) 16 U.S.C. §742d--directs the Secretary to make periodic reports to the public, to the President, and to Congress on the following: production and flow to market of fish and fishery products; availability and abundance and the biological requirements of fish resources; competitive economic position of fish and fishery products; statistics on commercial and sport fishing; improvement of production and marketing practices in regard to commercial species and the conduct of educational and extension services relative to commercial and sport fishing; and any other matters related to fish operations deemed by the Secretary to be of public interest.

(2) 16 U.S.C. §742h:

> "(a) The Secretary of the Interior shall make an annual report to the Congress with respect to activities of the United States Fish and Wildlife Service under sections 742a to 742d and 742e to 742j of this title, and shall make such recommendations for additional legislation as he deems necessary.
>
> "(b) The Secretary is authorized to make a report to the President and the Congress, and, when requested by the United States Tariff Commission in connection with section

1364 of Title 19, or when an investigation is made under the Tariff Act of 1930, the Secretary is authorized to make a report to such Commission, concerning the following matters with respect to any fishery product which is imported into the United States, or such reports may be made upon a request from any segment of the domestic industry producing a like or directly competitive product--

"(1) whether there has been a downward trend in the production, employment in the production, or prices, or a decline in the sales, of the like or directly competitive product by the domestic industry; and

"(2) whether there has been an increase in the imports of the fishery products into the United States, either actual or relative to the production of the like or directly competitive product produced by the domestic industry."

The transfer of functions under Reorganization Plan No. 4 makes most of the reporting required by section 742h the duty of the Secretary of Commerce.

(3) 16 U.S.C. §744--directs the Secretary of Commerce to submit annually to Congress a detailed statement of expenditures under all appropriations for "propagation of food fishes."

(4) 16 U.S.C. §757b--the Secretary is directed to report to the States, Congress, and Federal water resources construction agencies on studies to conserve, develop, and enhance the anadromous and Great Lakes fisheries.

(5) 16 U.S.C. §760f--authorizes (does not direct) the Secretary to report to the public the results of research on migratory marine fish of interest to recreational fishermen, conducted pursuant to §760e.

(6) 33 U.S.C. §1442(c)--the Secretary is directed to report to Congress on the results of research, conducted pursuant to this section, on possible long-range effects of pollution, overfishing, and man-induced changes of ocean ecosystems.

Congress might want to consider consolidating, or at least summarizing in one single place, the reporting that is required (mandatory) of the Secretary of Commerce. In addition, section 742h, and possibly other sections, could be clarified by separating reports required of the Secretary of Commerce from those required of the Secretary of the Interior. This is another instance where the statute's failure to reflect the transfer of functions under Reorganization Plan No. 4 creates ambiguities.

III. FEDERAL ASSISTANCE

Federal assistance for the benefit of U.S. fisheries is provided in various forms to both the States and the fishing industry itself.

A. States

The law provides for financial assistance to the States as follows:

(1) 16 U.S.C. §777c--provides for apportionment of funds by the Secretary of the Interior (transferred to Secretary of Commerce) among States for fish restoration and management projects.

(2) 16 U.S.C. §779 et seq.--provides for apportionment of funds by the Secretary of Commerce among the States to carry out projects designed for the research and development of the commercial fisheries resources of the nation.

(3) 16 U.S.C. §1223--authorizes the Secretary of the Interior to share the cost of managing, developing, and administering any area, lands, or interest therein within an estuary and adjacent lands which are owned or thereafter acquired by a State or by any political subdivision thereof.

(4) 16 U.S.C. §1379(b)--authorizes grants to States to assist them in developing and implementing State programs for the protection and management of marine mammals.

(5) 16 U.S.C. §1454--authorizes grants to coastal states to assist in developing a management program for the land and water resources of its coastal zone.

(6) 16 U.S.C. §1455--authorizes grants to coastal states for not more than two-thirds the cost of administering a coastal management program.

(7) 16 U.S.C. §1461--authorizes grants to coastal states of up to half the cost of acquiring, developing, and operating estuarine sanctuaries for the purpose of studying natural and human processes occurring within the estuaries of the coastal zone.

In addition to direct financial assistance to the States in the fisheries area, the Federal Government provides other types of assistance to the States pursuant to Federal statute:

(1) 16 U.S.C. §661--authorizes the Secretary of the Interior (with some functions transferred to the Secretary of Commerce) to "provide assistance to, and cooperate with, * * * State * * * agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat, in controlling losses of the same from disease or other causes, in minimizing damages from over-abundant species * * *."

(2) 16 U.S.C. §667b--authorizes use of federally-owned property for wildlife conservation purposes by the States.

(3) 16 U.S.C. §753a--authorizes the Secretary of the Interior or the Secretary of Commerce, as appropriate, to enter into cooperative agreements with States to develop research and training programs for fish and wildlife resources. Federal participation is limited to assigning Federal personnel to serve at cooperative research units, supplying certain equipment, and paying incidental expenses of Federal personnel.

(4) 16 U.S.C. §757a--authorizes the Secretary of the Interior (with transfer of functions to the Secretary of Commerce) to enter into cooperative agreements with one or more States for the conservation, development, and enhancement of the anadromous fishery resources of the nation.

(5) 16 U.S.C. §760a--directs the Secretary of Commerce to study fish of the Atlantic coast in order to recommend to the coastal States appropriate measures for the development and protection of such resource.

(6) 16 U.S.C. §§760-2 thru 760-12--provide for construction and operation of fish hatcheries in several different States.

(7) 16 U.S.C. §777--directs the Secretary of the Interior (with transfer of function to the Secretary of Commerce) to cooperate with the States in fish restoration and management projects. While this is mostly in the form of financial assistance, there is provision (see section 777h) for use of Government personnel and other forms of assistance for these projects.

(8) 16 U.S.C. §1201 et seq.--the Secretary of Commerce is authorized to cooperate with and provide assistance to the States in controlling and eliminating jellyfish.

(9) 16 U.S.C. §1221 et seq.--provides for non-financial, as well as financial, assistance to the States to develop the Nation's estuaries.

(10) 16 U.S.C. §1380--authorizes grants or other financial assistance to States to assist in research relevant to the protection and conservation of marine mammals.

B. Industry

In addition to providing assistance to the States, Federal law provides for assistance, financial and otherwise, to the fishing industry. Financial assistance (direct and indirect) to members of private industry is provided as follows:

(1) 16 U.S.C. §742c--authorizes the Secretary of the Interior (with transfer of functions to the Secretary of Commerce) to make loans for financing or refinancing the cost of purchasing, constructing, equipping, maintaining, repairing, or operating new or used commercial fishing vessels or gear.

(2) 16 U.S.C. §760d--authorizes the Secretary of Commerce to make grants to public and nonprofit private universities and colleges to promote the education and training of professionally trained personnel (including scientists, technicians, and teachers) needed in the field of commercial fishing.

(3) 19 U.S.C. §1309 and 26 U.S.C. §4221--provide exemption from customs duties and internal revenue (excise) taxes for supplies of vessels of the United States employed in the fisheries or in the whaling business.

(4) 22 U.S.C. §§1973 and 1977--provide financial assistance (reimbursement) to fishermen for certain financial charges and losses sustained as the result of seizure by a foreign country outside that country's territorial waters.

(5) 46 U.S.C. §1177--allows owners or lessors of vessels to enter into agreements with the Secretary of Commerce to establish a capital construction fund, contributions to which are tax deductible, to provide replacement vessels, additional vessels, or reconstructed vessels, built in the United States for operation in the fisheries of the United States.

(6) 46 U.S.C. §1271 et seq.--authorizes the Secretary of Commerce to guarantee obligations that aid in financing or refinancing construction, reconstruction, or reconditioning of vessels owned by U.S. citizens for use in, among others, the fishing trade or industry; and financing or refinancing the purchase of vessels acquired by the Secretary as a result of payment on a defaulted loan.

(7) 46 U.S.C. §1401 et seq.--authorizes the Secretary of the Interior to subsidize the construction of fishing vessels in the shipyards of the United States. No applications for such subsidies were to be accepted after June 30, 1972.

Federal assistance to industry is provided for in forms other than financial assistance:

(1) 7 U.S.C. §612c and 15 U.S.C. §§713c-2 and 3--promote certain commercial activities for fish products.

(2) 16 U.S.C. §661--authorizes the Secretary of the Interior (with transfer of functions to the Secretary of Commerce) to provide assistance to, and to cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat, in controlling losses of the same from disease or other causes, and in minimizing damages from overabundant species.

(3) 16 U.S.C. §1538--exempts fish importers and exporters from certain requirements of the Endangered Species Act.

(4) 22 U.S.C. §1971 et seq.--provides for protection of U.S. fishing vessels seized by foreign countries and directs the

Secretary of State to take action for the welfare and release of U.S. vessels and fishermen.

(5) 46 U.S.C. §§367 and 404--exempt fishing vessels from required inspection of steam vessels.

(6) 46 U.S.C. §601--prohibits attachment of wages of fishermen.

The Federal statutes thus provide for various forms of assistance to benefit the U.S. fisheries. Direct financial assistance to the industry breaks down into three basic forms--subsidies (46 U.S.C. §1401 et seq.), loans (16 U.S.C. §742c), and loan guarantees (46 U.S.C. §1271 et seq.). The subsidy and loan programs pertain only to fishing vessels, while the loan guarantee program is for the benefit of other vessels as well. Congress might want to consider an overall review of these direct assistance programs to consider the following questions:

(1) Should they all be within the same title of the United States Code? Presently, the loan program is under title 16 and the other two are under title 46.

(2) Should a separate loan guarantee program for fishing vessels be established?

(3) Should 46 U.S.C. §1401 et seq., (subsidies), administered by the Secretary of the Interior, be amended to be administered by the Secretary of Commerce? If the Reorganization Plan has already transferred this function, then the statute should be amended to reflect the transfer.

(4) Should the 1972 date beyond which applications for subsidies were not to be accepted, be extended again?

(5) Should the statutes spell out more precisely eligibility guidelines for each category of assistance? Under present law, no criteria are provided to guide the Secretary in determining that an applicant is not eligible for a loan, but is eligible for a loan guaranty.

IV. ENFORCEMENT AND SANCTIONS

Laws would have little impact if there were no provision for sanctions and enforcement. The following departments and agencies have enforcement responsibility over the following fishery-related laws:

(1) 14 U.S.C. §2--establishes general enforcement powers of the Coast Guard as follows:

> "The Coast Guard shall enforce or assist in the enforcement of all applicable Federal laws on and under the high seas and waters subject to the jurisdiction of the United States; shall administer laws and promulgate and enforce regulations for the promotion of safety of life and property on and under the high seas and waters subject to the jurisdiction of the United States covering all matters not specifically delegated by law to some other executive department; * * *"

(2) 16 U.S.C. §772d--directs the Coast Guard, the Customs Service, and NOAA to enforce the Northern Pacific Halibut Act (16 U.S.C. §772 et seq.).

(3) 16 U.S.C. §776d--directs the President to designate a Federal agency to be responsible for enforcing the Sockeye Salmon or Pink Salmon Fishing Act of 1947 (16 U.S.C. §776 et seq.).

(4) 16 U.S.C. §785--directs the Secretary of Commerce to enforce the law prohibiting taking of sponges of specified sizes (16 U.S.C. §781 et seq.).

(5) 16 U.S.C. §852d--directs personnel of the Secretary of the Interior or the Secretary of Commerce, as appropriate, to enforce the law that regulates transportation of black bass.

(6) 16 U.S.C. §916j--directs the Secretary of Commerce to enforce the Whaling Convention Act of 1949.

(7) 16 U.S.C. §959(b)--makes the Coast Guard, the Department of Commerce, and the Bureau of Customs responsible for enforcing the Tuna Conventions Act of 1950, and the Secretary of Transportation, in cooperation with the Secretary of Commerce, responsible for enforcing the provisions relating to vessels engaged in whaling.

(8) 16 U.S.C. §971d--directs the Secretary of Commerce to enforce the Atlantic Tunas Convention Act of 1975, while making enforcement activities at sea under this Act the responsibility of the Secretary of the department in which the Coast Guard is

operating (in peacetime, the Department of Transportation), in cooperation with the Secretary of Commerce and the Customs Service.

(9) 16 U.S.C. §986--directs the Secretary of Commerce to enforce the Northwest Atlantic Fisheries Act of 1950, while making enforcement activities relating to vessels engaged in fishing the responsibility of the Secretary of the department in which the Coast Guard is operating, in cooperation with the Secretary of Commerce.

(10) 16 U.S.C. §§1025a and 1027(a)--directs the Secretary of Commerce to enforce the North Pacific Fisheries Act of 1954, while making enforcement of activities relating to vessels engaged in fishing the responsibility of the department in which the Coast Guard is operating, in cooperation with the Secretary of Commerce.

(11) 16 U.S.C. §1083(a)--makes enforcement of the law prohibiting foreign fishing vessels in U.S. territorial waters the responsibility of the Secretary of Commerce, the Secretary of the Treasury, and the Secretary of the department in which the Coast Guard is operating. This section was repealed by the 1976 Act.

(12) 16 U.S.C. §1100a-1(b)--makes enforcement of the law prohibiting certain foreign vessels in U.S. fisheries the responsibility of the Secretary of Commerce and the Secretary of the department in which the Coast Guard is operating.

(13) 16 U.S.C. §1100b-8--directs the Secretary of Commerce, the Secretary of the department in which the Coast Guard is operating, and the Secretary of the Treasury to enforce the Offshore Shrimp Fisheries Act of 1973.

(14) 16 U.S.C. §1182--makes enforcement of the Fur Seal Act of 1966 the responsibility of the Secretary of the Interior, the Secretary of Commerce, the Secretary of the Treasury, and the Secretary of the department in which the Coast Guard is operating.

(15) 16 U.S.C. §1377(a)--directs the Secretary of Commerce to enforce the Marine Mammal Protection Act of 1972.

(16) Section 311 of the 1976 Act--"The provisions of this Act shall be enforced by the Secretary [of Commerce] and the Secretary of the department in which the Coast Guard is operating * * *."

The enforcement laws are consistent in selecting the Department of Commerce and the Coast Guard as the primary bodies to enforce the fishery laws. Certain arrest and seizure powers usually are granted by statute to the enforcing agency. Along with enforcement statutes, sanctions or penalties are prescribed, usually a fine and/or imprisonment. The maximum amounts of fines prescribed under older statutes may not be appropriate today due to inflation. For example, 16 U.S.C. §772e calls for a fine of not more than $1,000 for violation of the Northern Pacific Halibut Act of 1937. $1,000 today is certainly not equivalent to $1,000 in 1937 and it might be more appropriate to impose higher fines today. The fine for catching certain size sponges, up to $500 (16 U.S.C. §783), has not been changed since its enactment in 1914. In addition to considering amendment of these two provisions, Congress might want to consider amending the following statutes because the fines they authorize may also be outdated: 16 U.S.C. §§666a, 772f, 776c, 853, 916e and f, 989, and 46 U.S.C. §319.

V. CONCLUSION

The fishery laws, generally, could be improved with some reorganization, recodification, and clarification.

First, Congress might consider reorganizing and recodifying most of the fishery laws under one title of the United States Code. While many of the laws are now in title 16, many others are scattered throughout other titles (e.g., titles 15 and 46) of the Code. Either title 15 or title 16 would be a logical place for the fishery laws, with a separate chapter or chapters on fisheries. Of course, there are laws that pertain to fisheries that also pertain to other matters and would be best left in place.

Fisheries laws, when revised and recodified, should be separated from wildlife laws and from shipping laws. Fish conservation appears to be different from wildlife conservation and properly should be treated separately. Likewise, it might be helpful to separate fish-related laws from general shipping laws. In such areas as research and financial assistance to the fishing industry, consolidation of the laws would also be beneficial.

Further, in recodifying the laws, the powers and the duties and responsibilities of the Secretary of Commerce could be clearly defined to reflect the transfer of functions under Reorganization

Plan No. 4 of 1970. For example, 16 U.S.C. §742h, which lists a variety of Fish and Wildlife Reports to be made by the Secretary of the Interior, has been changed by the Reorganization Plan. The statute does not reflect this change except for a note at the end of the provision that does not help define the functions transferred to the Secretary of Commerce without reference to the Reorganization Plan itself, which does not, in all cases, completely clarify matters. A provision of law like section 742h could be divided into two separate statutes--one designating wildlife reports required of the Secretary of the Interior and the other designating fish reports required of the Secretary of Commerce. Many laws could be changed in the same way.

APPENDIX II

Popular Names of Laws

U.S. Code citation appearing in text	Popular name of law
7 U.S.C. §1011	Food and Agriculture Act of 1962
7 U.S.C. §1621 et seq.	Agricultural Marketing Act of 1946
15 U.S.C. §713c-3	Fishery Products Act
16 U.S.C. §§460k-460k-1	Refuge Recreation Act
16 U.S.C. §4601-12	Federal Water Project Recreation Act
16 U.S.C. §§661-667e	Fish and Wildlife Coordination Act
16 U.S.C. §§694-694b	Fish and Game Sanctuary Act
16 U.S.C. §§742a-754	Fish and Wildlife Act of 1956
16 U.S.C. §744	Predacious Fishes Act
16 U.S.C. §§755-757	Columbia Basin Fishery Development Act
16 U.S.C. §§757a-757f	Anadromous Fish Conservation Act
16 U.S.C. §§758-758d	Farrington Fishery Resources Act
16 U.S.C. §§772-772i	Northern Pacific Halibut Act of 1937
16 U.S.C. §§776-776f	Salmon Fishery Act, also referred to as Sockeye Salmon Fishery Act of 1947
16 U.S.C. §§777c, 777e-777g, 777k	Federal Aid in Fish Restoration Act Amendments of 1970
16 U.S.C. §§781-785	Sponge Act
16 U.S.C. §§835, 835c-835c-2, 835c-4	Columbia River Basin Project Act

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16 U.S.C. §§851-856	Black Bass Act
16 U.S.C. §§916-916l	Whaling Convention Act of 1949
16 U.S.C. §§971-971h	Atlantic Tuna Conventions Act of 1975
16 U.S.C. §§981-991	Northwest Atlantic Fisheries Act of 1950
16 U.S.C. §§1021-1023, 1025-1032	North Pacific Fisheries Act of 1954
16 U.S.C. §§1051-1058	National Fisheries Center and Aquarium Act
16 U.S.C. §§1081-1086	Bartlett Act (three-mile fishery jurisdiction)
16 U.S.C. §§1091-1094	Bartlett Act (twelve-mile fishery jurisdiction)
16 U.S.C. §§1100b-1100b-10	Offshore Shrimp Fisheries Act of 1973
16 U.S.C. §§1151-1159, 1161-1168, 1171-1172, 1181-1187	Fur Seal Act of 1966
16 U.S.C. §§1221-1226	Estuarine Areas Act
16 U.S.C. §§1361, 1362, 1371, 1381, 1384, 1401-1407	Marine Mammal Protection Act of 1972
16 U.S.C. §§1451-1464	Coastal Zone Management Act of 1972
16 U.S.C. §§1531-1543	Endangered Species Act of 1973
21 U.S.C. §301 et seq.	Federal Food, Drug, and Cosmetic Act
22 U.S.C. §§1971-1979	Fishermen's Protective Act of 1967
22 U.S.C. §2730(o)	The Foreign Assistance Act of 1961, 1965 Amendment
22 U.S.C. §2753(b)	Foreign Military Sales Act

29 U.S.C. §213(a)(5)	Maximum wage and maximum hours provisions of Fair Labor Standards Act
33 U.S.C. §1104	Marine Resources and Engineering Act of 1966
33 U.S.C. §1123	National Sea Grant College and Program Act of 1966
33 U.S.C. §§1441-1442	Marine Protection, Research, and Sanctuaries Act of 1972
43 U.S.C. §1312	Submerged Lands Act
46 U.S.C. §11	Registry Acts
46 U.S.C. §251	Coasting and Fishing Act
46 U.S.C. §259	Enrollment of Vessels Act
46 U.S.C. §§319, 325	Anti-Smuggling Act
46 U.S.C. §§531-534	Motor Boat Act of 1940
46 U.S.C. §601	Seamen's Act of 1915
46 U.S.C. §§1159, 1177	Merchant Marine Act of 1970
46 U.S.C. §§1271-1276, 1279a and b	Federal Ship Financing Act of 1972
46 U.S.C. §§1401-1413	United States Fishing Fleet Improvement Act

PROFILES OF IMPORTANT U.S. FISHERIES

CLAMS

The clam is a bivalve mollusk found buried in subtidal or intertidal beach and mud flats out to depths of over 30 fathoms. The shells which encase the clam's body are joined together at the back by a hinge usually visable from the outside. Two prominent features of the clam's body are the foot and siphon or "neck." The muscular foot aids the clam in digging up or down in the soft sand or mud. The retractable siphon is a tubelike extension taking water in and out of the clam. In some species the siphon consists of the two tubes. The incoming water brings food and oxygen to the clam; the outgoing water carries the waste products away. In the United States almost all the clam production comes from New England, Middle Atlantic, and Chesapeake Bay States. The Pacific coast commercial clam production comes primarily from Washington and is small, accounting for about 1.3 percent of total 1973 landings. However, potential exists to increase Pacific coast clam production, especially from the underused clam resources of Alaska.

Along the Atlantic coast the three clam species ranking highest in commercial importance are known as hard clams, soft clams, and surf clams. Hard clams are highest in value while surf clams are largest in volume. Most of the hard clam fishery landings are recorded in Middle Atlantic States of New York and New Jersey. Hard clam landings valued at $16.9 million, using exvessel prices, ranked this fishery sixth among Atlantic coast fisheries in 1973. Surf clams are harvested predominantly in the Middle Atlantic and Chesapeake Bay areas with New Jersey and Virginia leading in production. With landings valued at $9.8 million in 1973, this fishery ranked eighth among Atlantic coast fisheries. New England and Chesapeake Bay States are the primary soft clam production areas. In recent years Maine has produced most of the soft clams. The soft clam fishery ranked 11th among Atlantic coast fisheries in 1973 with landings valued at $6.9 million.

STATUS OF FISHERIES

Current harvest

Landings of hard, soft, surf, and other clams in 1975 were 111 million pounds worth a record $41 million. The quantity landed in 1975 is lower than record landings of 119.9 million pounds in 1974. This decrease was due principally to a decline in surf clam landings from a record level of 96.1 million pounds in 1974 to 86.9 million pounds. Landings and value of the clam fisheries from 1965 to 1975 are shown in Table 1.

TABLE 1

U.S. Landings and Value of Clams by Major Species 1965-1975

(Meat weight)

Year	Hard		Soft		Surf		Other		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
	(000 omitted)									
1965	15,044	$9,943	11,308	$3,381	44,088	$ 3,197	409	$212	70,849	$16,733
1966	15,324	10,524	11,919	3,974	45,113	3,876	395	177	72,751	18,551
1967	16,182	11,981	9,823	3,936	45,054	4,352	441	217	71,500	20,486
1968	15,426	12,176	10,368	4,189	40,552	4,137	900	226	67,246	25,728
1969	16,154	13,445	13,481	5,555	49,575	5,913	1,535	326	80,745	25,238
1970	16,015	14,344	12,908	5,982	67,318	7,730	2,963	735	99,204	28,791
1971	16,666	16,918	12,652	6,798	52,535	6,890	2,636	700	84,489	31,306
1972	16,153	19,220	9,078	5,563	63,471	7,941	1,987	491	90,689	33,215
1973	14,505	17,361	8,627	6,905	82,370	9,867	2,038	525	107,540	34,658
1974 (Note a)	15,008	19,918	8,594	6,801	96,110	12,211	197	74	119,909	39,004
1975 (Note a)	14,827	20,436	8,759	7,729	86,919	12,556	524	275	111,029	40,996

a/ Preliminary data

APPENDIX III

Surf clams have recently accounted for over 75 percent of total clam landings but only about 30 percent of the total value. Virginia, for the fourth consecutive year, led in surf clam landings with 39.1 million pounds, a 33-percent decrease from 1974. New Jersey was second with 35.6 million pounds of meats, a 57-percent increase over 1974. These two States have historically accounted for the majority of surf clam landings. Table 2 shows 1975 clam landings by State. The majority of surf clams in recent years have been caught in offshore waters. For years 1973, 1974, and 1975 preliminary data shows that 88.2 percent, 77.4 percent, and 50.9 percent, respectively, were landed beyond 3 miles off the coast.

Hard clam landings have been consistently between 14 to 17 million pounds annually and have averaged about 15 percent of the total clam catch. This species, however, has accounted for about 50 percent of the value of all clam landings. New York, with over half of the catch, is the leading hard-clam-producing State; New Jersey is second. Hard clams are harvested almost entirely within 3 miles of the coast. Less than 1 percent were harvested beyond this distance in years 1973 to 1975.

In 1975 Maine continued as the leading soft-clam-producing State with about 75 percent of the total landings of 8.8 million pounds. Maryland was the leading soft-clam-producing State until 1972 when Hurricane Agnes caused extensive damage to the resource. Since that time production has been relatively low. For example, 1975 preliminary data shows Maryland's landings at about 1.1 million pounds in comparison to 6 million pounds landed in 1971.

Washington in 1975 produced about 99 percent of total Pacific coast hard and soft clam landings of 670,000 pounds valued at $342,000. All clam landings along the Pacific coast were obtained inside 3 miles of the shore.

Several other clam species comprise the "other clam" category, including the cockle, geoduck, ocean quahog, rangia, razor, and sunray venus. In 1975 landings for this group amounted to 524,000 pounds and were valued at $275,000 or about 1 percent of domestic production.

The surf clam is the only major clam resource harvested beyond 12 miles off the coast, and since it has the protection of being a continental shelf fishery resource, there is no foreign directed clam fishery off the U.S. coasts.

Fishing fleet

Surf clams are harvested using vessels towing dredges. The hydraulic jet dredge is the main piece of surf-clam-harvesting gear. Dredges are towed

TABLE 2

1975 Clam Landings by State (note a)
(Meat weight excluding the shell)

States	Surf clam		Hard clam		Soft clam		Other clams		Total		Percent value
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	
	(000 omitted)										
New England:											
Maine	-	-	8	17	6,547	5,692	-	-	6,555	5,709	13.9
New Hampshire	-	-	-	-	-	-	-	-	-	-	-
Massachusetts	20	9	850	1,020	750	700	-	-	1,620	1,729	4.2
Rhode Island	16	4	1,120	1,422	16	20	-	-	1,152	1,446	3.5
Connecticut	-	-	251	115	-	-	-	-	251	115	.3
Middle Atlantic:											
New York	4,580	768	8,668	14,301	63	76	3	1	13,314	15,146	37.0
New Jersey	35,550	4,720	1,620	1,651	169	141	-	-	37,339	6,512	15.9
Delaware	2,314	362	70	7	-	-	-	-	2,384	369	.9
Chesapeake Bay:											
Maryland	5,351	1,011	58	45	1,057	1,015	-	-	6,466	2,071	5.1
Virginia	39,088	5,682	1,088	1,022	-	-	-	-	40,176	6,704	16.4
South Atlantic:											
North Carolina	-	-	285	226	-	-	-	-	285	226	.6
South Carolina	-	-	176	221	-	-	-	-	176	221	.5
Georgia	-	-	-	-	-	-	-	-	-	-	-
Florida	-	-	120	132	-	-	-	-	120	132	.3
Pacific Coast:											
Alaska	-	-	-	-	-	-	11	19	11	19	-
Washington	-	-	510	255	152	76	510	255	1,172	586	1.4
Oregon	-	-	3	2	5	9	-	-	8	11	-
California	-	-	-	-	-	-	-	-	-	-	-
Total	86,919	12,556	14,827	20,436	8,759	7,729	524	275	111,029	40,996	100
Percent	78.3	30.6	13.3	49.8	7.9	18.9	.5	.7	100	100	

a/ Preliminary data

APPENDIX III

behind powered vessels and have a wide blade which scoops up the clams loosened from the ocean bottom by water jets aimed downward in front of the blade. One advantage of this gear has been the tremendous reduction in the number of broken clams and damaged meats in comparison to other clam dredges. It has been adapted for use on the many different sizes and types of vessels.

The Middle Atlantic surf clam fleet has undergone changes since the mid-1960s. The most important have been the movement of vessels and the expansion and modernization of the fleet. Following reduced landings in traditional New Jersey beds and discovery of surf clam beds off the Virginia coast, the fleet spread out during the late 1960s and the 1970s in a southern direction. There is an apparent trend back toward New Jersey waters as landings have declined off the coast of Virginia. The average age of the fleet has decreased and the average length has increased with the addition of large steel stern-dredges. The fleet has increased from 54 in 1965 to 99 in 1975. These vessels are more than 100 feet in length and have up to 120-inch dredge blades.

Hard clams are harvested by a variety of methods ranging from hand gathering to complex machinery. Types of hand gear used are: clam rakes (clam hooks or hoes), scratch rakes (basket rakes), tongs, and bull rakes (mud rakes). Mechanical gear includes hydraulic and escalator dredges. These dredges vary in size and design and are usually permitted only on privately owned or leased bottoms. Table 3 shows the amount of landings by gear used for hard clams and other clams for 1972.

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TABLE 3

Summary of Clam Landings
by Gear, 1972
(Meat weight)

Gear	Pounds					Percent
	Surf clam	Hard clam	Soft clam	Other clam	Total	
	(000 omitted)					
Dredges	63,466	3,287	1,950	1,642	70,345	77.5
Rakes	2	7,265	120	9	7,396	8.2
Hoes	3	10	6,978	2	6,993	7.7
Tongs	-	3,826	-	-	3,826	4.2
By hand	-	986	30	-	1,016	1.1
Shovels	-	331	-	171	502	.6
Picks	-	373	-	-	373	.4
Diving outfits	-	-	-	163	163	.2
Otter trawls	-	75	-	-	75	.1
	63,471	16,153	9,078	1,987	90,689	100.0

In New York, which produces most of the hard clams, clam diggers currently use about 4,000 small boats, approximately 14 to 30 feet long, to harvest hard clams. In addition, 25 boats harvest from private grounds using mechanical equipment.

The main types of hand gear used to harvest the soft clams are clam hoes. Escalator dredges are used primarily in the Chesapeake Bay region. This highly mechanized fishery was nonexistent before 1950, but with the invention of the escalator dredge, it rapidly expanded. The Maine soft clam fishery is essentially a seasonal hand labor industry requiring a small investment. The necessary gear and equipment are four-tined, short-handled hoes, half bushel rollers, and a means of transportation to and from the flats. Small outboard motor boats or row boats are used except where flats are easily accessible by land.

Pacific coast clams are harvested by hand or dredge. The size of the operation determines the equipment used. Although mechanical harvesters are available and in use, many clams are still harvested by hand, using rakes, forks, shovels, and other devices.

Products and processing

Clams are sold in a variety of forms and used in many different ways. Clams are sold in the shell either fresh or

frozen or with the meat removed (shucked) and sold fresh or frozen. Clams are baked, steamed in the shell, broiled on the half shell, fried or used in chowders, fritters, sauces, dips, salads, and canapes.

Clams are sold packed in cans in large quantities as shown in the following table.

TABLE 4

U.S. Canned Clam Production by Type of Final Product
1972

Production	Number of plants	Standard cases	Percent	Pounds	Percent	Value	Percent
Whole	3	3,731	-	55,965	-	$ 123,624	-
Minced	13	700,088	24	10,501,320	13	9,150,463	31
Chowder	10	1,953,214	66	58,596,420	73	17,161,756	58
Juice	9	208,212	7	6,246,360	8	827,151	3
Specialties	12	98,860	3	4,745,280	6	2,394,951	8
Total		2,964,105	100	80,145,345	100	$29,657,945	100

Surf clams are produced and sold as processed food products. The final products are unique because they include only the muscle tissue and are not sold on the fresh market directly to the consumer. Before 1970 only the larger clams were acceptable due to manual processing in the industry. The development of automated shucking and eviscerating equipment and more efficient washing processes have made it technologically possible to process smaller clams.

After shucking, the clams are washed, taken to the processing plant where they are eviscerated, and washed again to remove any remaining foreign material. At this point the meat may be minced, chopped, or sliced into strips. It can then be canned, made into chowder or clam cakes, refrigerated, or frozen and shipped to other processors of specialty products. The juices and wash water from this operation are sometimes packed as clam juice.

Much of the surf clam industry is vertically integrated from harvesting through processing. Surf clam production plants are located along the Atlantic coast. Between 1965 and 1974 the total number of shucking, processing, and canning plants increased from 37 to 48 with most of the increase accounted for by additional shucking plants.

Most of the hard clams in New York and New Jersey are sold and consumed as shell stock. The few processing operations produce clam chowder, frozen clam broth, deviled clams, minced clams, and stuffed clams. The largest and least expensive of the clams are marketed as "chowders."

"Cherrystones" are medium-sized and medium-priced clams used almost exclusively for baked clams. "Little necks" are the smallest and most expensive and are used mostly in the half-shell trade and as steamed clams.

Processing of soft clams consists of desilting and washing for resale or shucking. At the shucking plant, broken and small clams are discarded because they are difficult to hand shuck. After shucking, clams are washed in a large air agitated water bath, drained and packed in gallon cans, and chilled in a cold room for several hours. The chilled cans are then placed in barrels and iced for shipment to market.

Canned clams from the Pacific coast must compete with canned clams from the Atlantic coast and with imports which are usually Manila clams from Japan. Pacific coast clams are usually more expensive than the others and this tends to depress the price to a level making canning only marginally economical on the Pacific coast.

Some clams that are processed for use as crab bait are washed, then dyed to identify them as crab bait. The clams are then usually placed into 25- or 50-pound sacks and frozen complete with shell. No significant plant equipment is required for this process. The frozen clams are stored at the cannery until sold to the fishermen.

Markets

Clams are high in protein. Between 1965 and 1974, as shown in table 5, apparent aggregate consumption of clams in the United States has increased 73 percent. Per capita consumption has increased from .373 pounds in 1965 to .589 pounds in 1974. Clam imports, also shown in table 5, have increased in recent years. In 1974 clam imports were valued at $5.8 million. Exports of clams are reported combined with other shellfish exports and as such are considered relatively small. The exvessel prices for major clam species since 1965 are shown in table 6.

The largest markets for hard clams are New Jersey, New York, and Pennsylvania. Other major markets are in Florida, Illinois, and California.

About 45 percent of Maine's 1974 soft clam production was consumed within the State, while the other 55 percent went primarily to Boston, Massachusetts, where distribution is provided for the soft clam markets centered in the New England area.

Clam markets are highly concentrated in three regions--New England, Middle Atlantic, and Pacific. Together these areas account for about 85 percent of the national clam consumption.

TABLE 5

Supply and Consumption of Clams, All Forms in the United States, 1965-74

(Meat weight)

Pounds

Year	Supplies		Apparent aggregate consumption (note b)	Per capita consumption
	Landings	Imports (note a)		
	(millions)			
1965	70.8	1.5	72.3	.373
1966	72.8	2.1	74.9	.383
1967	71.5	1.8	73.3	.371
1968	67.2	2.0	69.2	.347
1969	80.7	2.9	83.6	.415
1970	99.2	4.9	104.1	.511
1971	84.5	4.2	88.7	.431
1972	90.7	5.1	95.8	.460
1973 (note c)	106.3	4.3	110.6	.525
1974 (note c)	119.9	4.9	124.8	.589

a) In shell or shucked clams, canned clams, and canned chowder converted to meat weights.
b) Canned clam exports are not shown because they are recorded only in combined form with "other shellfish." However, clam exports are considered to be relatively small.
c) Preliminary data.

TABLE 6

Exvessel Value of Clams by Major Species 1965-74

(Meat weight)

Year	Hard	Soft	Surf
	(cents per pound)		
1965	66.1	29.9	7.2
1966	68.7	33.3	8.6
1967	74.0	40.1	9.7
1968	78.9	40.4	10.2
1969	83.2	41.2	11.9
1970	89.6	46.3	11.4
1971	101.5	53.7	13.1
1972	119.0	61.3	12.5
1973 (note a)	120.2	79.1	11.9
1974 (note a)	132.7	79.1	12.7

a) Preliminary data.

APPENDIX III

EFFECTS OF A 200-MILE LIMIT

The Fishery Conservation and Management Act of 1976 extends U.S. jurisdiction over coastal fisheries resources and provides for improved fishery management. NMFS officials believe that the surf clam will be managed by a Regional Fishery Management Council because the majority of the catch has been harvested beyond 3 miles off the U.S. coast and because the surf clam is a continental shelf-fishery resource. The other major clam species are caught predominantly within the 3-mile territorial zone under State jurisdiction.

Employment

The number of fishermen in the U.S. clam fishery remained relatively stable during the period 1960 to 1971 as shown in the following table. Employment in the Pacific coast fishery declined from 3,187 in 1960 to 809 in 1972. Overall processing employment figures were not readily available.

TABLE 7

U.S. Clam Fishery
1960-71

Year	Number of fishermen
1960	16,094
1961	16,080
1962	14,716
1963	16,341
1964	16,013
1965	16,884
1966	16,459
1967	15,457
1968	14,369
1969	15,141
1970	14,979
1971	16,638

Recreational fishing

Recreational clam digging is a very popular activity. Large numbers of people and large amounts of clams are involved. One NMFS study estimated that recreational catch of clams in 1970 was about 40 million pounds (including shells). The number of recreational clam diggers in some States is very large. For example, New Jersey licensed about 15,000 recreational clam diggers in 1975. In Maine there are an estimated 10,000 recreational clam diggers.

Recreational clam digging has had a widespread impact on the commercial clam fisheries in some States. For example, in California, Oregon, and Washington, commercial harvesting for clams has been severely restricted and prohibited in many areas in order for the recreational clam digger to have access to the clam resource. The number of clam diggers in California is not known but it is considerable. On one weekend, over 150,000 people were seeking clams on Pismo Beach. During a 2-1/2-month period, some 4 million pounds of clams were taken from a 4-mile stretch of this beach. In 1971 Oregon reported a recreational catch of 3 million clams. Annually, some 300,000 individuals make 650,000 to 775,000 trips to the Washington ocean beaches and take home from 6 to 13 million razor clams.

Management controls

Clam fisheries are managed by State or local governments. Regulations vary by fishery and by State. The Federal Government has declared the surf clam a continental shelf fishery resource. Beyond this action, there is no direct Federal regulation of clam harvesting. The surf clam fishery has been unregulated in some States, including Maryland and Virginia. As of July 1, 1976, Maryland has a License Requirement and has given the State's Department of Natural Resources authority to adopt rules and regulations regarding the catch and landings of surf clams. New York, New Jersey, and Delaware have both license and operational requirements. For example, New York has a minimum shell size regulation; Delaware has seasonal closure regulations; and New Jersey has regulations covering such aspects as seasonal closure, limitations on gear size, minimum shell size, and the time during the day when fishing is permitted. To help coordinate State management of the surf clam, the States and NMFS, through the State-Federal Fisheries Management Program, initiated a cooperative surf clam management effort in 1973. Although some improvements have been made, progress has generally been slow.

In New Jersey and New York, the center of the hard clam fishery, harvesting of hard clams in public areas is restricted to use of hand implements, such as raking and

tonging. No dredging is permitted in public areas. A license is required for commercial harvesting. Relaying programs are also used as a type of management control. A relaying program consists of moving clams from condemned waters to clean water where the clams can purify themselves before being harvested and marketed. Another management control is the leasing of bay bottoms for shellfish culture. However, only naturally unproductive areas are leased which leaves the productive areas available to the public.

In Maine, the soft clam fishery is regulated by the State and local governments. A license is required for commercial harvesting and seasons, if necessary, vary by area and local conditions. Mechanical gear, such as dredges, are generally prohibited. In Maryland, dredges are permitted and are the only gear used in subtidal areas.

The States regulate and manage the clam fisheries of the Pacific coast. For example, in Washington, clam-farming licenses are issued which allow private individuals to cultivate and harvest privately owned or leased clam beds. In some areas, the State leases clam beds to private individuals for harvest of the natural production.

Management of clams is also affected by the National Shellfish Sanitation Program (NSSP), a cooperative agreement administered by the member shellfish-producing States, the Food and Drug Administration, and the Shellfish industry to provide satisfactory public health protection to consumers of shellfish. Most States have enacted laws that restrict the importation of fresh and frozen clam products except from those States that are members of NSSP and from certified interstate shippers from within those States. The canned, heat-retorted clam products can be shipped interstate without NSSP membership.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT

Resource availability

The availability of clam resources shows a potential for substantially increased production of some species, particularly from underutilized ones. For the surf clam, however, landings in recent years have exceeded the estimated maximum sustainable yield (MSY). In a 1976 analysis of the fishery, NMFS estimated the surf clam MSY at about 70 million pounds. Landings in 1973, 1974, and 1975 have exceeded this level. The highest annual landings total was made in 1974 when 96 million pounds were recorded. NMFS officials believe that 1976 landings should be reduced to below the level of about

40 million pounds which is biologically sustainable at the 1975 population size and recruitment rate.

An MSY has not yet been established for the hard clam resource. Nevertheless, a State fishery official believes that the natural resource is being harvested at sustainable levels. More resource assessment information is needed and would aid management of the fishery. Propagation efforts for hard clams have emphasized artificial spawning and culling the young clams which are relatively easy to raise. These clams are reared in specially designed hatcheries and are then transplanted to controlled growing areas. Development of a method to protect clams from predators, such as starfish and crabs, would also boost commercial production and would encourage the operation of clam hatcheries.

In Maine, which produced about 75 percent of soft clams in 1975, there is no established MSY for the resource. But a State official believes that the resource is being fished at about the sustainable level possible with current harvesting gear, hand hoes. Use of this gear, according to the State official, results in large numbers of clams left dying in the clam flats. With the use of a hand dredge, generally prohibited in Maine, a State official estimates that current yields could be increased 100 percent or more. The increase is related to a large reduction in the mortality of clams in the flats caused during harvesting and to harvesting new areas where using hand hoes is uneconomical.

The Maryland soft clam resource was hit hard by Hurricane Agnes in 1972. Since then, the fishery has not yet recovered, in part due to less favorable salinity rates in the water and clam predators. A State biologist, however, believes that there will be a substantial increase in landings within the next few years.

On the Pacific coast, Alaska has a large number of underutilized clam resources, but Washington is presently recognized as the center of clam production on the west coast. A commercial harvest of clams in California and Oregon is virtually nonexistent. In Alaska past and present production has not approached the estimated sustainable yield. The true sustainable yield is unknown, but a University of Alaska Sea Grant study estimates that yield to be about 50 million pounds (shell weight) a year. The maximum catch in Alaska has only been one-tenth of that amount and in recent years has not exceeded 1 million pounds.

In Washington the Puget Sound region has potential for enlargement of the present clam fisheries and development of new ones. A survey by divers of the Washington State Department of Fisheries estimated there were over 100 million pounds of subtidal hardshell clams. With this extensive standing crop, the annual production could be increased without fear of overfishing. Harvesting of these subtidal clams will have to be done with dredges or other underwater methods. Successive crops of clams can be produced from hardshell beds harvested by a hydraulic clam digger.

Another survey indicated over 100 million geoduck clams are present in the intertidal zones of Puget Sound to a depth of about 200 feet. With current restrictions, Washington's geoduck fishery could grow to an estimated annual landing of 2 to 3 million pounds. Fairly extensive beds of soft clams occur at the mouth of several rivers in the Pacific Northwest. Companies have begun harvesting these clams with hydraulic escalator harvesters on privately owned or leased beds in the intertidal zone.

Studies on the feasibility of planting hatchery-reared clam seed on Puget Sound beaches have demonstrated that seed clams will survive and grow, but this approach has not yet become economical.

Another underutilized clam resource with potential for a large volume of landings is the ocean quahog. Its range in the United States along the Atlantic coast includes a distance from Maine to Cape Hatteras, North Carolina. While landings have averaged less than 2 million pounds per year, NMFS estimates of MSY show a potential yield of about 70 to 100 million pounds a year.

NMFS analysis of clam aquaculture indicates that at least six species have potential for aquaculture, but only the eastern hard shell clam is cultured with the sophisticated methods used for oyster culture. Production of clams by aquaculture could be increased from 2.6 million pounds to an estimated 25 million pounds by 1990 if adequate seed could be produced in hatcheries and if methods can be developed for culture of juveniles to field planting size.

Harvesting capability

Advancements in gear efficiency offer potential for improved harvesting capability. Although there is already enough capacity to harvest existing surf clam resources, harvesting techniques can be substantially improved. Surf clam dredges must periodically be lowered to the ocean bottom, towed, and then raised to obtain the catch. Equipment

that would continuously lift clams from the dredge to the deck would save time in comparison with present operations. Prototypes of equipment have demonstrated that this principle is workable. One industry official stated that it may not be adopted because it would require more than the normal two- or three-man crew and that it may not be economically practical. He stated, however, that more efficient gear is needed.

More efficient hard clam harvesting is possible in some public areas; however, the two leading hard clam States limit harvesting in these areas to hand implements and power dredges, for example, are not permitted. Hand gear is used in both States in public areas, and fishermen have adapted to its use. State officials stated that hard clam fishermen generally oppose dredges in public areas. Also, State officials believe that using dredges without strict controls could lead to depletion, especially since they believe the resource is being fished at about sustainable levels.

Soft-clam-harvesting methods could be more efficient according to a Maine official. Use of hand dredges, originally developed for limited use in mildly polluted areas, but having applicability in most areas, would cause less mortality of clams left in the flats and would allow increased yields from the fishery. Fishermen have opposed permitting general use of the hand dredge, according to a State official, because they believe its use would upset the tradiional ways of the fishery and cause both a loss of income and employment for many of them.

Washington clam fishery has adequate harvesting capability as mechanical harvesters from the east coast have been adapted to meet most harvesting conditions on the Pacific Coast. Some types of hydraulic dredges are very efficient. For example, one type has been reported as catching 95 percent of the marketable clams in its path with less than 1 percent breakage.

A drag dredge, similar to the eastern surf clam dredge, is being tested in Alaska to harvest the abundant razor clam resource which historically has been harvested by hand digging. This mechanical harvester is capable of harvesting during high tides and in subtidal waters. In recent years several manual hydraulic diggers have been developed and used. Although mechanical harvesters are available and in use, many small operators still hand dig clams.

Product development and processing

Clams and clam products are already widely accepted in current forms. However, there are opportunities for further developments in clam products and processing. For example, the largely underutilized ocean quahog resource with an estimated MSY of 70 to 100 million pounds and landings under 2 million pounds, offers a substantial opportunity for development. Product uses could include clam cakes, fritters, chowders, and many other dishes which can use a clam flavor. Some of the reasons why the resource has not yet been developed more fully include the quahog's flavor which is stronger than some clam species, such as the surf clam, and its dark color. The availability of the successfully developed surf clam having some similar product usage also appears to have limited development of the quahog. But since the surf clam has been overfished, demand for the quahog is expected to increase. NMFS and industry officials cooperatively working on quahog development are confident that its use will be substantially expanded.

Another area where there may be potential for product development involves use of the discarded parts of the surf clam ranging from 11 to 18 percent of the total meat weight. On the basis of average annual landings of 44.7 million pounds of surf clam meats from 1965 and 1969, some 5 to 9 million pounds of this waste was discarded. If a profitable use for this protein and a technique to handle it efficiently in the plants could be developed, then the waste could be used more effectively and a disposal problem would be solved. However, one industry official stated that no one plant produces a sufficient quantity to make such an operation economically feasible at the present time or in the near future.

Soft clams are hand processed. Development of an automatic shucking machine would be of substantial benefit to the industry. However, automation is made difficult by the many sizes and parts of the clam. Heat shock treatments and nitrogen freezing have been tried, but the resulting product has had only limited market acceptance.

Clam processing on the Pacific coast is labor intensive, but automated production machinery to process frozen clams exists on the east coast and is available if needed.

Marketing potential

Available clam products are readily sold into existing markets. In addition, projections of future conditions show a steadily increasing demand for clam products. Some specific examples of market expansion include increased distribution

of hard clams in newly developed markets in California, Florida, and Illinois; and clamoto juice, a drink combining clam juice and tomato juice. This product can also be used as a mixer for cocktails.

In Alaska the greatest potential market for razor clams is the Pacific Northwest and California. This market is familiar with the razor clam, and a large institutional market for Alaska's fresh and frozen razor clams could be easily developed. Presently, a large percentage of the clam harvest in Alaska is used for crab bait.

OBSTACLES FOR GROWTH AND DEVELOPMENT

Resource availability and management controls

Lack of management controls, insufficient data on resource assessment, and pollution have been problems affecting clam resource availability. In 1976 an analysis of the surf clam MSY by NMFS estimated the amount at about 70 million pounds, thus more clearly showing the extent of overfishing of clams in years 1973 to 1975 when landings exceeded this amount.

Concern about depleting the inshore part of surf clams, generally located within the 3-mile territorial zone, led New Jersey industry members in September 1971 to recommend strong conservation measures within the State. As a result, in November 1971, New Jersey requested that the surf clam be considered for participation in the State-Federal Fisheries Management Program. The matter was discussed with the appropriate States in February 1972, but a State-Federal Management Committee was not formed until June 1973. This delay was partly due to the concentration of the fishery at the time in New Jersey and to State and NMFS involvement in management programs for the American lobster and northern shrimp. The committee established as its goals the conservation of surf clams and protection of the industry.

Little coordinated regulation has been achieved to insure surf clam conservation. Slow progress in implementing coordinated management in surf clam fishery has been attributed to a combination of factors, including lack of funding for research and difficulties in obtaining biological information needed for determination of the MSY. Fragmented jurisdiction is another problem. The resource is located off the coasts of five States with most landings in recent years coming from 3 to 15 miles offshore, a distance beyond direct State control. Also, the surf clam is a common property resource. More and better vessels have been added to the fleet and fishing has increased rapidly.

Cyclical increases in the green crab population is a major problem to soft clam resource availability. Soft clams are a favored food item of the green crab. To combat this problem, Maine is providing funds to aid construction of fences to help keep the green crabs away from the small soft clam.

Pollution in coastal areas, particularly bacterial contamination, represents the greatest obstacle to the soft and hard clam resource. Other pollutants include oil and heavy metals. Pollution is responsible for closing about 21 percent of the clam flats in the leading soft-clam-producing State and about 25 percent of the clam flats in the two leading hard-clam-producing States. Interim solutions include transplanting contaminated clams to clean waters or to depuration plants, facilities where clams can be cleansed befor marketing. Ultimately, the solution is effective pollution abatement.

Another problem relates to occasions when the clam's body accumulates paralytic shellfish poison (PSP), a toxin produced by microscopic plants. Although not normally a problem, these plants occasionally bloom explosively causing the so-called red tide. Clams can accumulate a sufficient quantity of the toxin to cause illness or death to people eating them. State and Federal agencies monitor for red tide and prohibit harvesting and sale of affected shellfish. The toxin may remain for several months, and there is no known method to hasten the natural process of detoxification.

A Washington Department of Fisheries study estimates that there are 100 million pounds of subtidal hard clams in the State; however, only a few million will be available for commercial harvest. Many clam beds identified will not be harvested because the ocean floor may not be conducive to mechanical harvesting, the water may be too deep or too rough for existing gear, or the clam beds may be closed because of pollution. Adverse public reaction to the commercial clam harvest by mechanical dredge may also restrict future availability.

In 1965 Washington stopped issuing commercial clam diggers' licenses, since only a small amount of public land was available within the bays and most of this was needed for expanding recreational demand. Although the individual commercial clam digger was eliminated from public land, the State continued to issue a clam-farming license. This license allowed clam growers to commercially produce clams from private areas.

Clam production in Alaska is principally razor clams, because most hard clams and cockles are found in areas subject to shellfish poisoning and clam harvesting is prohibited. From a peak of three-quarters of a million pounds in the early 1950s, razor clam production decreased to less than 100,000 pounds in the late 1960s and later increased to about 200,000 pounds. The great reduction in razor clam harvests was primarily attributable to harvesting restrictions because of the danger of paralytic shellfish poisoning.

In Alaska the clams are abundant, but full commercial use is restrained. For 21 years, Alaska was not a member of the National Shellfish Sanitation Program, and without this membership, Alaska processors were not allowed to ship fresh or frozen clam products interstate. This was a major obstacle inhibiting growth and development of the Alaska clam fishery. As of March 1975, the State was readmitted to the National Shellfish Sanitation Program. With this obstacle removed, Alaska clam resources can be more fully used. However, continued National Shellfish Sanitation Program membership is necessary for the fishery to remain.

The availability of clams is limited by the number of beaches certified safe for clam harvest. More State resources are needed for source-beach certification and monitoring if processors are to have a sufficient source of supply. Another obstacle that exists in Alaska is that relatively little knowledge exists about the size and location of stocks and about many important biological characteristics pertinent to effective planning.

Harvesting capability

Generally, there is sufficient harvesting capacity in clam fisheries, although overfishing in the surf clam fishery indicates excess harvesting capacity. Improvements are possible in harvesting efficiency in some soft clam and hard clam areas, but as noted in the opportunity section, gear restrictions are a limiting factor.

In the Washington clam fishery, adequate harvest capability exists. In Alaska the ability to compete against the east coast clam products and the foreign imports depends on the development of an environmentally safe and productive clam dredge. If introduction of the dredges is delayed, so will the growth of the fishery because of Alaska's very high cost of labor. Conflicts may also arise in Alaska between hand harvesters and dredge harvesters over access to the approved clam beaches.

Product development and processing

Past clam product development and processing have led to expansion of this fishery. Although there are some difficulties related to product development and processing opportunities, as noted previously, there are no major obstacles preventing further developments. Labor intensive processing for some clam products will continue until it becomes profitable to use automatic equipment.

Market potential

The major obstacle for market development of clams is the adverse effect that paralytic shellfish poisoning has on the clam fishery. When a ban on harvesting of shellfish is put into effect, public confidence in shellfish products declines and sales drop significantly in affected areas. Paralytic shellfish poisoning incidents can have severe results on the clam fishery.

Presently, canned clam products from Alaska cannot compete with the lower cost, east coast canned clams because of Alaska's higher cost of harvesting and processing.

CRABS

Crab fisheries are found on the Atlantic, gulf, and Pacific coasts of the United States. On the Atlantic and gulf coasts, blue crab is the predominant species landed. Blue crab is a common inhabitant of rivers, sounds, and nearshore waters of the Atlantic coast from New Jersey to Florida, and along the gulf coast to Texas. The Pacific coast consists primarily of three crab species: the king, tanner or snow, and dungeness. The king and tanner crabs are caught off Alaskan shores, and the dungeness crab is caught off nearly the entire Pacific coast, from western Alaska to Santa Barbara, California.

The Chesapeake Bay area, is the center of the Atlantic blue crab fishery. In 1973, 64 percent of the total crab landings in the Atlantic Coast States, excluding Florida came from this area. In 1974 about 80 percent of the blue crab landings in the gulf came from Florida and Louisiana. Alaska led the Pacific coast crab catch with over 90 percent of the landings and 83 percent of the value in 1975. Alaska also led the Nation in volume and value of the crabs landed in 1975.

In 1973 the Atlantic blue crab fishery ranked third in volume and seventh in value among fisheries along the Atlantic coast. In 1972 the gulf blue crab fishery ranked fourth in volume and sixth in value among fisheries along the gulf coast. Along the Pacific coast, the crab fishery was third in value in 1972; a volume ranking was unavailable.

Other crabs found along the Atlantic and gulf coasts are the stone crab and the red crab. However, because the blue crab is the predominant species landed on the Atlantic and gulf coasts, our discussion will center on the blue crab fishery.

The stone crab is found along the South Atlantic and gulf coasts, and is widely used for food in areas where it is plentiful. In the Gulf States, the commercial stone crab fishery is limited to Florida. In 1974 this fishery accounted for 21 percent of the value, but only 5 percent of the weight of all Gulf State crab landings.

Red crab, a deep sea animal found from Nova Scotia to Brazil, primarily supports a small fishery in southern New England. No fishery exists in the Gulf of Mexico although crabs are taken as an incidental catch in the shrimp and bottomfish fisheries. No biomass estimates for red crab exist, but NMFS plans to develop this data. NMFS biologists

believe that red crab resources in the DeSoto Canyon off the west coast of Florida might support a marginally profitable fishery. The market for red crab would not differ from that of blue crab as the product forms are the same.

STATUS OF FISHERY

Current harvest[1/]

The Atlantic blue crab landings in 1973 were 91.7 million pounds, a decrease from the 1972 landings of 108.5 million pounds; the value increased from $11.4 million to $13.1 million. The Gulf States blue crab catch in 1974 was 47.9 million pounds, up from the 1973 catch of 47.5 million pounds. The 1974 catch was valued at $6.4 million, as compared to the 1973 catch value of $6.0 million.

Both the Atlantic and gulf blue crab harvests have fluctuated widely over the years. These fluctuations appear to be independent of the number of crabs which spawn, but the reasons for variations are not known. Environmental conditions and fishing pressures have been suggested as causal factors.

In the gulf, the crab harvest normally decreases if shrimp are plentiful and shrimp prices are good. More fishermen would enter the shrimp fishery during this time.

The total Pacific crab catch in 1975 was 162.2 million pounds, worth $61.5 million; this was 15.5 million pounds less than the 1974 catch, but the value was $734,000 greater than the 1974 value.

The 1975 king crab catch, up 3 percent from 1974, was the highest since 1968. The rise in the king crab catch since 1970 seems to indicate that the Alaska resource is recovering from overfishing which occurred in past years.

The tanner crab fishery showed a 28-percent catch decrease in 1975 from the 1974 record catch of 64.1 million pounds. The tanner crab fishery had developed rapidly in the last 7 years from 3.2 million pounds in 1968 to the record 1974 catch before dropping back to 46.2 million pounds in 1975. The decrease was mainly caused by poor market conditions and high inventories in cold storage. Also, a price dispute between fishermen and buyers almost halted tanner crab fishing during part of the 1975 fishing season.

[1/] The latest data available was used in all cases.

The 1975 dungeness crab catch of 16.0 million pounds worth $10.3 million, was about the same as in 1974, but the value increased 4 percent. The catch from these 2 years seems to indicate a stabilization of the declining dungeness crab catch which began in 1970.

Products and processing

Blue crabs are caught and marketed in both the hard shell and soft shell stages. Many crabs, known as peelers, are caught just prior to molting. Soft shell crabs are considered a delicacy and bring higher prices. Almost the entire body of this crab may be eaten after cooking; the gills, abdomen, and sometimes the face are removed.

Hard shell crabs may be sold live, whole cooked or steamed. When steamed the meat is picked from the shell, and either packed into containers, refrigerated, and sold as fresh crabmeat, or canned, pasteurized, and refrigerated. Crabmeat is marketed as lump meat--whole lumps from the large body muscles which operate the swimming legs; flake meat--small pieces of white meat from the body; flake and lump--a combination of the two; and claw meat--a brownish tinted meat from the claws. Picked crabmeat is used in convenience foods, such as crab cakes, deviled crab cutlets, bite-sized deviled crab, crab imperial, crab soup, and crab balls.

Pacific coast crabmeat is primarily sold frozen although it is also sold canned. Frozen crab is marketed in the shell, as whole leg sections or claws or out of the shell as meat. King and tanner crab is sold canned, frozen, and fresh, while dungeness crab is usually sold fresh.

Crabmeat picked by machine involves less labor but has several disadvantages. Machine-picked meat (1) contains shell fragments, (2) is broken in small pieces, (3) is salty, as a result of the brine used to separate the meat and shell fragments, and (4) yields less crabmeat per pound of whole crab than that obtained by hand picking. These factors contribute to the low demand for machine-picked crabmeat.

Markets

Crabs, are highly regional and the market declines rapidly as distance increases from the landing site. Therefore, crabs are virtually unknown in the interior of the United States.

The largest markets for Atlantic blue crab are in the shore areas of Virginia, Maryland, and New Jersey, and the cities of Baltimore, Washington, Philadelphia, and New York.

These cities are the center of the basket trade, a term used to describe the sale of large live crabs having a high market value. The primary markets for soft shell crabs are on the east coast, particularly New York City. A large percent of the soft shell crabs are frozen which enables them to be shipped long distances and made available throughout the year. Pasteurized meat, when available, may be shipped to any part of the United States.

Blue crabs are marketed by gulf fishermen in three ways: direct sales to the consumer, sales to seafood dealers, and sales to crab buyers. Some fishermen have regular customers, including operators of restaurants and bars. Seafood dealers sell to processing plants or to the public, while crab buyers act as middlemen who purchase hard crabs for large crabmeat plants. Some live hard-shell crabs are shipped to the east coast for sale. This is more common in cooler months, as during warmer months, loss of crabs due to heat makes this unprofitable.

Soft-shell crab fishermen in the gulf usually sell their catches to seafood dealers, as relatively few restaurants deal directly with these fishermen. Market demand and prices are currently high although production has been declining. The decline is attributed to shortages of knowledgeable personnel or personnel willing to devote the time required, lack of a steady source of premolt crabs, and poor water quality.

A 1972 NMFS report stated crab consumption was heavy in the Pacific Coast States, including Alaska. This area accounted for over 40 percent of the crabs consumed in the United States and the per capita rate was three times greater than the national average. NMFS further indicated that this region consumed over three-fourths of its king and dungeness crab output, with the remainder going into interregional trade.

There is no reported international trade in the blue crab fishery. However, in 1975 Alaska exported 3.1 million pounds of king crab valued at $8.1 million.

Fishing fleet

Blue crabs are caught by different gear, including:

a. Crab pot--Usually cube shaped, 2 feet on each side, and made of hexagonal wire mesh. The pot is divided into two chambers; a lower bait chamber which contains a bait holder and has an inward opening entrance, and a trap chamber located

over the bait chamber. Crab pots of a similar size and shape but with smaller mesh and different bait are used to catch peeler crabs for the soft-shell market. In the Pacific, fishermen use crab pots to catch king, tanner, and dungeness crabs.

b. Hand-dip trotline--A baited, hookless line anchored on the bottom in moderate to deep water. Each end of the line is attached to a buoy and an anchor line. In harvesting the catch the line is run over a spool attached to the boat which brings the baited line to the surface; the crabs clinging to the bait are then quickly scooped with a dip net.

c. Crab dredge--A heavy dredge consisting of a rectangular iron frame, bearing a 6-foot toothed drag bar on its lower edge and trailing a mesh bag made up of rings and cotton twine.

d. Scrape--A rectangular metal frame fitted with a bag made of cotton and iron rings, particularly effective for taking soft crabs. The scraping bar does not have teeth.

e. Crab pound net--An enclosure constructed of stakes and wire netting. The crabs enter the pound net on the flood tide.

f. Seine--An encircling type of net made of webbing. The top or float line has floats attached to keep the net at the surface while the bottom or foot line is weighted with lead to keep the net vertical in the water.

g. Dip net--A simple piece of gear made of cloth mesh or wire which is suspended from a metal oval hoop and fitted with a handle.

Gulf fishermen use bush lines and shedding cars for catching soft shell crabs. Crabs about to molt are attracted to, and later picked from the bushes. The fishermen use crab shedding cars or recirculating tanks to keep the crabs alive while they complete the molting process.

In 1972, 9,562 vessels and boats; 298,395 crab pots; 8,242 trotlines; and 318 crab dredges were used to land blue crabs in the Atlantic States. In the Gulf States in 1972, 1,615 boats; 160,782 crab pots; 724 trotlines; and 42,750 bush lines were used to land blue crabs.

In the North Pacific, the crab fleet also catches shrimp and groundfish. The overall number of vessels in the crab fishery was not available, but in the Eastern Bering Sea the crab fleet increased from 20 vessels in 1967 to over 100 in 1974. Most were large modern crabbers, many in excess of 100 feet.

Employment

Statistics on processing employment for the Atlantic coast were not readily available. Statistics on the number of commercial fishermen are not accurate because they include many recreational fishermen. States adjacent to the Chesapeake Bay have a daily catch limit for recreational fishermen and with the exception of the winter dredge fishery, there are no catch limits on commercial fishing. In some States, the fee for a commercial fishing license is minimal; as a result, many recreational fishermen pay the commercial license fee to avoid the catch limit.

On the gulf coast, commercial blue crab fishermen can be classified as full time, seasonal, or casual. Because the full-time crabber's income depends on his catch, he must be a highly skilled fisherman. Soft-shell crab fishermen and some hard-crab fishermen are considered seasonal fishermen. Casual crab fishermen are usually persons who previously were in the fishery but, because of the unreliable nature of the fishery, have taken jobs in industry. On days off, weekends, and vacations, these men fish for crab.

Statistics as to the number of personnel engaged in blue crab processing on the gulf coast are not readily available. There is a shortage of pickers because higher wages can be earned in other occupations, and satisfactory incomes are provided by assistance programs.

In 1972, according to NMFS, the Pacific coast crab fishery employed 3,009 fishermen, some of whom also fished in other Pacific fisheries. We could not determine separate employment figures for the crab fishery because of this multiple fishing pattern.

Recreational fishing

The blue crab resource supports a large recreational fishery on the Atlantic coast. Due to the problem of identifying the number of recreational fishermen, there is no accurate recreational catch data. Data is further limited by the absence of catch reporting requirements for blue crab fishermen. However, the recreational catch in one of the leading

blue crab producing States may be as large as the commercial catch.

On the gulf coast, conflicts between commercial and recreational fishermen are minor and of a local nature. They receive little or no publicity, and casual crabbers usually stop operations during a conflict.

Although there is recreational fishing for crab in the Pacific, the annual catch is very small when compared to the commercial harvest. Recreational catch estimates range from 30,000 pounds in Oregon to 500,000 pounds in Alaska annually.

Management controls

Control and regulation of the blue crab fisheries along the Atlantic coast is administered by the Coastal States from New Jersey to Florida and the Potomac River Fisheries Commission. The Commission's authority originated from the Potomac River Compact of 1958, an expression of Virginia's and Maryland's common interest in the conservation and improvement of fishery resources they share in the tidewater section of the Potomac River. There are considerable differences among the States in terms of rules and regulations limiting the use of gear.

There is no overall management for the blue crab fishery in the Gulf of Mexico. Each of the Gulf States regulates the fishery through various catch and gear restrictions. As shown on the next page, there is no type of restriction which exists for all States.

Mississippi and Alabama do not prohibit the taking of egg-bearing females. Mississippi repealed a 10-year old prohibition in 1975 because a relationship between the number of eggs produced and the population level had not been demonstrated. Texas and Louisiana prohibit the taking of egg-bearing females, not to protect the resource, but because crab buyers do not want them landed as they yield less meat than other blue crabs. The prohibition, while not biologically sound, does not harm the resource. An NMFS zoologist stated that State regulations probably have a minimum effect on the size of the resource. Louisiana officials also feel this way about regulations concerning resource management.

The four Pacific Coast States exercise management controls over the Pacific coast crab fishery. All four States are involved in regulating the dungeness crab. In addition, Alaska regulates the taking of king and tanner crab.

Requirements and Restrictions on the Blue Crab Fishery in the Gulf States

	Florida (note a)	Alabama	Mississippi	Louisiana	Texas (note a)
Requirements:					
License permit	Yes	-	Yes	Yes	Yes
Gear tags	Yes	-	Yes	-	Yes
Catch restrictions:					
Gravid females	Yes	-	-	Yes	Yes
Size	Yes	Yes	-	Yes	-
Closed season	-	-	-	-	-
Number	-	-	-	-	-
Gear restrictions:					
Type	Yes	-	-	Yes	Yes
Size	-	-	Yes	-	Yes
Number	-	-	-	-	Yes
Construction	Yes	-	Yes	-	-

a/Some State laws and regulations may only apply to certain counties.

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In the dungeness crab fishery, regulations in all four States implement licensing fees, size limitations, sex limitations, and restrictions on form of gear or method of capture. Also in Alaska, California, and Washington seasonal time limitations are placed upon the fishery.

In the king and tanner crab fisheries, regulations consisted of gear or method of capture restriction and licensing requirements. Additional regulations, such as size and sex limitations and seasonal time limitations, were imposed upon the king crab fishery.

Since king crab is a creature of the Continental Shelf, the United States assumes jurisdiction outside the 12-mile fishery zone. Exercising this power, the United States entered into bilateral executive agreements with Japan and the Soviet Union establishing conditions under which foreign fisheries could operate. Under these agreements, foreign catches have been gradually reduced. The Soviets have not fished the Eastern Bering Sea for king crab since 1971. The Japanese king crab quota for 1975-77 was reduced to 2.1 million pounds annually, but they did not take any in 1975 and have indicated they will not take any in 1976. Catch quotas have also been established under bilateral agreements for the foreign tanner crab fisheries.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

The concept of a maximum sustainable yield is probably of limited usefulness for an annual species, such as the blue crab, in which abundance is highly variable and does not appear to be closely related to the number of spawners or the annual catch.

Because the blue crab is a short-lived species (2 to 3 years), a low survival rate of 1 year-class can produce an almost immediate decrease in availability. Year-class size is determined in larval or early crab stages. Fall sampling of young crabs 1/2 to 2 inches wide provides data for estimates of adult abundance.

In the Pacific, the king and dungeness crab fisheries are used intensively and are approaching their maximum sustainable yield. The tanner crab in the Eastern Bering Sea is the only Pacific coast species capable of expansion. According to NMFS survey results, the tanner crab outlook is good because of its large populations. NMFS believes that the

current abundance level of tanner crabs can continue to support present catch levels and that room for expansion exists.

Harvesting capability

According to State officials, there is a sufficient amount of gear in the blue crab fishery for fishermen to take advantage of abundant year-classes when they occur.

Trawls, which are more effective than traps, are used to take blue crabs in the coastal waters of the South Atlantic States. One researcher has suggested that an increased crabbing effort could be productive around the Mississippi River delta and in the Atchafalaya Bay area of Louisiana, and that trawls should be used in these two areas. Evaluations of trawl use in Florida and Mississippi are planned.

The crab harvesting capability along the Pacific coast is adequate to harvest the resources available. Even considering the potential tanner crab increase, the existing king crab fleet would be able to fish tanner crab.

Product development and processing

Mechanization of the picking process, and an extension of the shelf life of bulk-packed crabmeat and shoft-shell crabs offer growth opportunities in the blue crab fishery.

Most blue crabmeat now marketed is hand picked because machine methods do not remove enough shell, but the supply of workers is dwindling. When blue crabs are most abundant, processors have to limit crab purchases in proportion to their capacity to pick meat manually.

At a November 1975 crab industry conference, announcements were made concerning three crab picking machines that may revolutionize the processing industry. It is believed that these machines will improve the meat quality because there will be less contamination from handlers, and they are faster and more efficient in producing shell-free meat.

Future improvements in processing or product development in the Pacific crab fishery are not needed. Present capability is adequate to process all harvested crab in an acceptable and marketable manner.

Marketing potential

Present markets for blue crab are located primarily in coastal areas; therefore, there is an opportunity to develop

markets further inland. However, with demand and prices for blue crabs increasing, and processors having little difficulty selling to existing markets, large changes in market distribution are not necessary. Accordingly, neither industry nor State agencies in the Chesapeake see a need to actively engage in market development or promotional activities.

The marketing potential for Pacific crabs is also high, providing domestic production can be increased. Demand has remained strong despite considerable increases in price, but supply has inhibited growth in the market.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT

Resource availability

The major problem in the blue crab fishery is the wide variation in year-class abundance which adversely affects stability of the industry. There is insufficient information to determine whether the blue crab fishery can be maintained at any particular abundance level through conservation measures or whether the yield is wholly determined by natural factors.

In the gulf, NMFS biologists believe that resource assessment data is insufficient to make quantitative evaluation of stock status. Records of blue crab landings in the gulf are only rough estimates of the total annual catch. For example, in Louisiana, the actual harvest, including the recreational catch, may be twice as high as that indicated in the landing records.

While research data on environmental factors is limited, some problems have been identified. For example, sea grasses of Chesapeake Bay have been declining and in many areas eelgrass has completely disappeared. During their juvenile stages, Blue crabs as well as many other organisms depend upon the protection afforded by these grasses. State research is currently attempting to determine to what extent the crab is affected by the loss of this habitat.

Chemical pollutants can also adversely affect the fishery. Due to contamination from a pesticide known as kepone, the State of Virginia, on December 17 and 18, 1975, ordered the entire James River and its tributaries from the fall line at Richmond to the mouth at Chesapeake Bay, closed to the taking of shellfish and finfish until the effects of this substance could be more fully determined.

The closing of the James River has had serious economic implications for an estimated 150 fishermen who depend on it

for their livelihood. Their mobility to other grounds is impaired by the type of gear that they use. Fishermen from different locations are not tolerant of others moving into their crabbing grounds. As of June 11, 1976, a small portion of the James River was opened to the taking of crabs under certain constraints. The Environmental Protection Agency and State agencies are monitoring the kepone situation for any potential effect on fish migrating from the James River into the Chesapeake Bay and other areas.

The primary obstacle inhibiting growth in the Pacific coast crab fisheries is the lack of resource. The dungeness and king crab are under intensive use and are approaching their maximum sustainable yields.

In the tanner crab fishery where resources are underexploited, economics are inhibiting a more rapid development of the available resource. According to an NMFS official, the price received per pound for tanner crab is not high enough to draw fishermen away from more profitable fisheries. Unless the price for tanner crab increases or the other fisheries become less profitable, the tanner crab resource will probably continue its slow development.

Harvesting capability

On the Atlantic coast, laws governing the industry appear to be the only barrier to more efficient harvesting techniques. Some of the restrictions, such as size limits, are biologically sound and are important as conservation measures. However, some are based only on tradition while others were enacted to protect certain segments of the industry and may be inhibiting the development of more efficient gear. Examples include prohibition of dredges in one State, and, in another State, the implementation of a winter daily quota limit for fishermen using dredges. Nevertheless, fishermen indicate that they are satisfied with the traditional ways of crab fishing which are ingrained among them.

On the gulf coast, the use of trawls to take crabs is prohibited in Louisiana, the State which produces the greatest amount of blue crabs in the gulf. A State official stated that the prohibition is due largely to conflicts which would exist in law enforcement should trawling be permitted. Also, politicians, who are ultimately responsible for changing the laws, do not understand the issue. It has been recommended that trawling with large-mesh trawls should be permitted with seasonal and area restrictions.

Although the taking of crabs with trawls is allowed in all other Gulf States, trawls are not used. Either economically harvestable concentrations of crabs are not available

or the gravid females found in such concentrations are not in demand or may not be legally taken.

The opportunity to use crab scrapes to increase the harvest of soft-shell crabs has been ignored by soft-shell crabbers who seem reluctant to invest in new gear or change their shedding practices. Additionally, bottom conditions may preclude their use in some areas.

On the Pacific coast, we found no obstacles hindering the use of efficient harvesting techniques.

Product development and processing

Growth of the blue crab fishery on both the Atlantic and gulf coasts is strongly inhibited by processing limitations. During peak periods, the supply occasionally exceeds the processing capacity of local plants. At these times, crabbers are asked to stop fishing or the catch is shipped out of the area.

The blue crab industry at times has been affected by factors, such as development of the basket trade, labor supply problems, and fluctuations in resource abundance. Processors on the Atlantic coast stated that the basket trade, which involves selling large crabs live at premium prices, has deprived them of part of the resource. It is economically impractical for the processors to compete with the basket trade in buying large crabs. Consequently, they have to buy smaller crabs which are more difficult to pick by hand.

According to processors, many members of the available labor supply seek other types of work or apply for welfare or unemployment compensation as alternatives to picking crabs. In part this is due to the unpleasant working conditions in a crab processing plant. Also, with small crabs to process, a crab picker has to work hard to earn substantially more than the minimum hourly wage. Seasonal and yearly fluctuations in the supply of crabs affects the employment stability and adds to the problem. On the gulf coast, the problem appears to be that many people are willing to work provided the pay is under the table so that they can continue to collect welfare benefits. The industry has been reluctant to operate in this fashion, but if the labor shortage continues they may be forced to do so.

With fewer large crabs to work with and with labor supply problems, the need for efficient mechanical processing

has grown. Although some processors are experimenting with and investing in mechanical equipment, most have relatively small operations and with large fluctuations in resource supply there is a reluctance to make the necessary research and development investments. Because of the relatively short refrigerated shelf life of fresh picked crabmeat, further processing, such as freezing, pasteurizing, or canning is required if the meat is to be stored for later sale. The recent trend has been to pasteurize, which maintains flavor, texture, color, and wholesomeness for a long time.

On the Pacific coast, we found no product development or processing obstacles that hindered growth and development of the crab fishery.

Market development

Resource fluctuations and processing difficulties limit growth and development of blue crab markets. Consumers, when faced with a product that is not readily available, will in most instances seek substitutes.

Competition from Japanese and Taiwan crabmeat imports, both canned and frozen, is a major problem for the blue crab industry. Some of the minced crab from Japan is also competitive with certain blue crab products.

On the Pacific coast, the lack of proper handling and storage, education, and training by wholesalers and retailers result in inferior products being marketed. Crab processors stated that wholesalers and retailers are not insuring that frozen crab products are kept frozen until purchased or are refreezing thawed crab resulting in an unsatisfactory product. The crab processors felt that if properly maintained products reached the consumer, product demand would increase, particularly in the areas of the United States where frozen products comprise the total crab consumption.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

The Atlantic and gulf blue crab fishery is totally within State jurisdiction and thus is not affected by the Fishery Conservation and Management Act of 1976. A 200-mile fishing zone should have little effect upon the Pacific crab fishery as most foreign fishing has been curtailed.

APPENDIX III

ATLANTIC GROUNDFISH

Groundfish is the name applied to a group of fin fish species that is caught on or near the bottom of the ocean, including: cod, haddock, flounders, hakes, pollock, ocean perch and whiting (silver hake) in New England. Groundfish caught primarily in the Middle Atlantic, Chesapeake Bay, and South Atlantic include butterfish, croaker, and scup. Groundfish species have different biological characteristics, habits, and ranges. For example, pollock migrate and are found at various depths in the water column while yellowtail flounder remain relatively stationary on or near the ocean bottom.

U.S. fisherman have fished for groundfish since early colonial days. Flounder and cod provide the greatest tonnage and dollar income to U.S. groundfishermen. With 1973 landings of 112.2 million pounds, valued at $26.2 million using ex-vessel prices, flounders ranked second in volume and fourth in value among all species landed on the Atlantic coast. Cod ranked seventh in volume and tenth in value with landings of 50.4 million pounds worth $9.0 million. Other species, such as red and silver hake, are less valuable and are not heavily fished by U.S. fishermen. When combined, groundfish ranked first in value among Atlantic coast fisheries in 1973.

STATUS OF THE FISHERY

Current harvest

Atlantic coast groundfish landings have declined sharply since the early 1960s, as shown in table 1. Major declines occurred in the haddock, silver hake, ocean perch, and industrial fisheries. Decreased landings were due primarily to overfishing.

Table 1

Commercial Atlantic Groundfish
Landings (except Florida) (note a)

Year	Landings (pounds)	Value
	(millions)	
1960	529.8	$31.0
1965	492.3	37.6
1970	316.7	38.1
1972	281.2	42.7
1973	292.9	48.6
1974 (note b)	277.9	50.9
1975 (note b)	285.1	64.8

[a]Includes landings of cod, cusk, flounders, haddock, red and white hake, ocean perch, pollock, and silver hake (whiting).
[b]Preliminary data.

Large foreign fishing fleets appeared off the New England coast in the early 1960s, placing heavy fishing pressure on groundfish stocks. In addition to adversely affecting the economic position of U.S. fishermen by being intense competitors, foreign fleets have caused or contributed to the depletion of species such as haddock and yellowtail flounder stocks and reduced abundance in stocks of cod, ocean perch and lower value species such as red hake and silver hake. Overall groundfish abundance off the New England coast is estimated to have declined 45 percent between 1963 and 1972. Extremely large haddock catches were made on Georges Bank in 1965, primarily by the Soviet Union. Total haddock catches peaked in 1965 at about 330 million pounds then fell to less than 12 million pounds in 1973.

The foreign catch of major groundfish species off the Atlantic coast from Maine to Cape Hatteras, North Carolina, was 1.1 billion pounds or 71 percent of the total in 1965. Total catch quotas and country allocations, size limits, mesh regulations, and area closures have improved attempts to control fishing effort during the 1970s and have helped to reduce foreign catches of popular groundfish species such as cod and flounders. While foreign catches have declined since 1965, in most years they have exceeded 50 percent of total groundfish caught. For example, table 2 shows that in 1974, 60 percent of the total catch of major groundfish species in this area was made by foreign nations. Foreign fleets have not caught large quantities of groundfish off the South Atlantic coast.

The groundfish industry is concentrated at New England ports which accounted for about 80 percent of Atlantic coast groundfish landings and about 53 percent of U.S. landings of major groundfish species in 1975. Table 3 shows preliminary 1975 data on landings of major groundfish species by region. Groundfish landings by distance caught from shore are shown in table 4.

Except for a small directed trawl fishery in North Carolina, groundfish in the South Atlantic are usually caught incidentally to shrimp trawling. However, there is a hook and line fishery for snappers and groupers and a trap fishery for sea basses.

Table 2
Atlantic Groundfish Catches off the Atlantic coast from Maine to Cape Hatteras, North Carolina, 1974

Species	Pounds		
	U.S. catch	Total catch (including foreign)	U.S. catch as a percent of total
	(000 omitted)		
Cod	57,355	77,370	74
Haddock	6,653	11,290	59
Ocean perch	19,129	23,173	83
Silver hake	31,125	286,609	11
Red hake	6,038	73,922	8
Pollock	17,747	27,322	65
Yellowtail flounder	55,225	55,818	99
Other flounders	45,224	46,826	97
Total	238,496	602,330	40

TABLE 3
Commercial Atlantic Groundfish Landings (except Florida)
1975 (note a)

Species	New England		Middle Atlantic		Chesapeake		South Atlantic (except Florida)		Total Atlantic (except Florida)	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
	(000 omitted)									
Cod	55,146	12,858	740	239	15	4	-	-	55,901	13,101
Cusk	3,098	426	-	-	-	-	-	-	3,098	426
Flounders	78,314	27,192	9,677	3,445	4,311	1,227	11,662	3,588	103,964	35,452
Haddock	16,165	5,283	1	-	-	-	-	-	16,166	5,283
Hakes (red and white)	9,857	932	1,192	98	5	-	-	-	11,054	1,030
Ocean perch	32,052	3,304	-	-	2	-	-	-	32,054	3,304
Pollock	20,567	2,472	9	1	-	-	-	-	20,576	2,473
Silver hake	33,197	2,765	9,065	960	13	1	2	-	42,277	3,726
	248,396	55,232	20,684	4,743	4,346	1,232	11,664	3,588	285,090	64,795

a) Preliminary data.

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TABLE 4

Commercial Atlantic Groundfish Landings (except Florida) by Species, by Distance Caught Off the Atlantic Coast and Caught in International Waters off Foreign Shores, 1975 (note a)

SPECIES	Distance caught off Atlantic Coast						Caught in international waters off foreign shores		Total	
	0 to 3 miles		3 to 12 miles		Over 12 miles					
	Pounds (000 omitted)	Percent	Pounds (000 omitted)	Percent	Pounds (000 omitted)	Percent	Pounds (000 omitted)	Percent	Pounds (000 omitted)	Percent (note b)
Cod	4,387	8	14,426	26	35,963	64	1,125	2	55,901	100
Cusk	103	3	1,428	46	1,501	48	66	2	3,098	100
Flounders	21,445	21	14,976	14	67,275	65	268	-	103,964	100
Haddock	198	1	1,231	8	9,967	62	4,770	30	16,166	100
Hakes (red and white)	2,026	18	3,591	32	5,196	47	241	2	11,054	100
Ocean perch	92	-	470	1	19,444	61	12,048	38	32,054	100
Pollock	1,662	8	3,734	18	13,305	65	1,875	9	20,576	100
Silver hake	5,456	13	12,492	30	24,314	58	15	-	42,277	100
	35,369		52,348		176,965		20,408		285,090	

a) Preliminary data.

b) Percentages may not add due to rounding.

APPENDIX III

Fishing fleet

Until introduction of the otter trawl in the early 1900s, U.S. fishermen using hook and line and bottom longlines ranged as far as the Grand Banks off Newfoundland, Canada fishing for cod. In more recent times, the otter trawl, a net towed on or close to the ocean floor, has become the predominant gear used. Small amounts of groundfish are caught by other gear, including hand and longlines and gill nets.

TABLE 5

Commercial Atlantic Groundfish Landings (except Florida) by Types of Gear, 1972 (note a)

	Pounds (000 omitted)
Fish otter trawls	259,400
Gill nets (anchor, set or stake)	6,600
Hand lines and longlines (or set with hooks)	12,900
Other	2,300
Total	281,200

a) Includes cod, cusk, flounders, haddock, red hake, white hake, ocean perch, pollock and silver hake.

Groundfish vessels operate out of numerous ports along the coast. In New England, major ports include Portland and Rockland, Maine; Gloucester, Boston, New Bedford and Provincetown, Massachusetts; and Point Judith, Rhode Island.

Typical Atlantic coast otter trawl vessels are aging wooden size trawlers and range from about 15 to 150 gross tons. These vessels have capacities of from 10,000 to 160,000 pounds of iced fish. Large trawlers, over 150 gross tons, have capacities of up to 400,000 pounds.

Most of the New England groundfish catch is made by medium and large trawlers fishing on Georges Bank, a section of the Continental Shelf which is also heavily fished by foreign fleets. Georges Bank is located off the coast of New England. While U.S. vessels still journey to the Nova Scotia Banks where large amounts of ocean perch as well as other groundfish species are caught, higher fuel costs generally make it uneconomical to travel as far as the Grand Bank off Newfoundland, Canada. Smaller and older U.S. vessels normally fish close to the coastline because they are less able to survive storms in offshore areas. U.S. vessels

are much smaller than the large modern distant water foreign vessels which fish off our shores. Foreign vessels traveling long distances to fish must process and freeze the catch at sea. In addition to fishing vessels, some foreign fleets contain support ships including factory, command, supply, transport, and at times repair ships. Due to the closeness of shore processing and supply facilities, U.S. vessels do not need to be as large as foreign vessels and do not require the sea support typical of foreign fleets.

In 1972 the Atlantic coast groundfish fishery included about 765 otter trawl vessels and 54 boats. An analysis of vessel age showed that most New England groundfish otter trawl vessels were over 20 years old. Although some modern vessels have entered the fishery in recent years, NMFS officials stated that most of the fleet remains old and poorly maintained. An industry official, on the contrary, believes that most vessels have been well maintained, but that due to increasing maintenance costs as vessels become older, vessels need to be replaced as continued maintenance will no longer be economically practical. Industry officials conclude that the bulk of the New England groundfish fleet is less efficient than the relatively newer Canadian fleet and those newer U.S. vessels employing modern technology.

Products and processing

Most groundfish landed by Atlantic coast fishermen are processed for the fresh fish market. Fresh fish is sold in several product forms. Fish fillets are the fleshy sides of the fish cut lengthwise and fish steaks are cross section slices from large dressed (eviscerated with heads and tails removed) fish. These product forms are also sold frozen, as are fish sticks and portions which are highly processed convenience products. Fish sticks and portions are made from fish blocks which are fish fillets or minced fish frozen into blocks weighing 10 pounds or more. Almost all fish sticks and portions processed by U.S. firms are made from imported fish blocks.

Both hand labor and machines are used to fillet groundfish on the Atlantic coast. Machines are used extensively to remove the skin from fillets. Filleting machines are available for some species and are used by some processors, but according to an NMFS official, many processors do not process enough fish to economically justify the machines.

Gloucester, Boston, and New Bedford, Massachusetts are the major groundfish processing ports on the Atlantic coast. In 1974, according to a preliminary university study, there were

about 59 groundfish processing plants in New England--down from about 71 plants in 1965. These plants produced about $84 million worth of groundfish products in 1974, a large increase in value since 1965 when about $42 million worth of groundfish was produced. Most plants process more than one groundfish species and much of their production is made from imported groundfish.

Markets

U.S. per capita consumption of major groundfish products[1] has increased from 2.3 pounds in 1960 to 3.8 pounds in 1975. Total consumption increased 95 percent from 418.2 million pounds in 1960 to 813.5 million pounds in 1975. Most of the growth occurred in the frozen fish stick and portion market which increased from 112.5 million pounds in 1960 to 383.1 million pounds in 1975.

Fillet and steak supplies also increased, but at a slower rate, reflecting a consumer shift to the more convenient, less expensive stick and portion products. Imports have become a major factor in the frozen fillet market, increasing from 109.5 million pounds in 1960 to 304.6 million pounds in 1975. U.S. fillet and steak production is directed primarily to fresh markets. Most imported fillets and steaks are frozen because foreign fishing vessels are prohibited from landing fish directly at U.S. ports.

Groundfish prices vary depending on factors including: species, size, supply, season, and condition of the fish. Groundfish prices are affected by imports, which have increased dramatically in recent years. Studies of the effect of imports on the U.S. groundfish industry conclude that imports have dampened ex-vessel groundfish prices from 4 to 28 percent. Groundfish also compete in the market with meat, poultry, and other fish products. As prices for substitute meat products increase, demand for fish products, primarily frozen, increases.

[1]On the basis of total apparent use of fish sticks and portions; the estimated edible weight of U.S. landings of cod, haddock, ocean perch, halibut, and flatfish, and imports of those species; less U.S. production of frozen fish blocks.

Employment

Employment in the Atlantic groundfish harvesting industry declined steadily from 7,572 fishermen in 1960 to 5,980 in 1972. The decline is due in part, according to an industry official, to reduced crew sizes. For example, large trawlers which employed about 18 crewmembers 10 or 15 years ago now employ about 10 crewmembers.

According to a preliminary university study of total employment in groundfish processing in New England, it was estimated that 1,510 persons were employed during peak periods and 1,233 were employed during average periods in 1974. The estimate was calculated by dividing total employment in groundfish processing plants by the proportion of groundfish output to total output in those plants.

Recreational fishing

A 1970 NMFS salt water angling survey estimated that recreational fishermen caught about 113 million pounds of major groundfish species off the Atlantic coast, as shown in Table 6. Portions of the survey may not be accurate according to a NMFS official who stated that the reported average weights of some species appear to be unrealistically high. The total number of recreational anglers in the United States more than doubled between 1955 and 1970 from 4.5 to 9.4 million, but the rate of growth slowed considerably between 1965 to 1970. A more current survey covering recreational fishing in the North and Middle Atlantic areas is being prepared. Recreational catches of some groundfish species, such as certain stocks of cod and flounder, are large enough to have an appreciable effect on the resource.

TABLE 6

Atlantic Coast Recreational Groundfish Catch, 1970

Species	Fish caught (000 omitted)	Pounds
Cod	3,844	35,918
Flounders--summer	16,404	28,291
Flounders--winter	29,077	37,565
Haddock	501	2,528
Red hake	497	904
Silver hake	1,307	2,095
Pollock	2,451	5,584
Total	54,081	112,885

Management Controls

Each coastal State has jurisdiction over groundfish resources in its territorial waters, generally a distance of 3 miles off their coast. The Federal Government has jurisdiction over the contiguous zone, currently 3 to 12 miles off the coast, and over U.S. vessels operating in international waters. The Fishery Conservation and Management Act of 1976, effective March 1, 1977, extends Federal jurisdiction to 200 miles off U.S. coasts. The International Commission for the Northwest Atlantic Fisheries (ICNAF), representing member nations, recommends management actions to conserve fishery resources in international waters off the Atlantic coast from Maine to Cape Hatteras, North Carolina. In addition, bilateral fishing agreements have been negotiated between the United States and the Soviet Union, and Poland and Romania to provide an additional basis for management.

The States along the Atlantic coast have enacted numerous regulations affecting the groundfish fishery in their territorial waters, which include gear restrictions on trawling in certain areas or during certain seasons; licensing of fishermen and craft; and size limits for some species. For example, in Massachusetts there are a number of special legislative acts enacted over the years, which among other things, limit the type of gear which can be used in certain areas. Under these acts, trawling is prohibited within 3 miles off the coast in a large area north of Boston. Most State regulations, according to one State official, were designed to conserve the resources and to allocate them to maintain balance among competing user groups, but that many are antiquated and are in need of change.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT

Resource availability

The maximum sustainable yield (MSY) of groundfish off the Atlantic coast from Maine to Cape Hatteras, North Carolina, is about 774 million pounds. The quota for 1977 is 518 million pounds, reflecting in part the overfished condition of some species, as shown in table 7. In 1974 U.S. fishermen caught about 238 million pounds of groundfish in this area according to preliminary statistics. If resource availability is increased to levels approximating the MSY, a total of about 536 million additional pounds of groundfish would be available to U.S. fishermen. While less information

is available for other groundfish species caught in the South Atlantic, such as croaker, a NMFS official stated that groundfish abundance will allow large increases in catches. In 1975 croaker landings in the South Atlantic were about 10.3 million pounds.

NMFS scientists believe that effective resource management could allow depleted groundfish stocks to recover to levels approximating their long term MSY. The time needed for stock recovery will vary by species and is subject to several variables, including the stringency of conservation measures and environmental changes. Also, under the Fishery Management and Conservation Act of 1976, actual fishing levels will be set at the optimum yield of the fishery and will be determined by considering biological, economic and social factors, and is expected to be less than the MSY.

Table 7

MSY's (note a) and Quotas for the Commercial Groundfish Industry off the Atlantic Coast (note b) From Maine to Cape Hatteras, North Carolina

Species	Pounds	
	Estimated MSY	1977 quota
	(000,000 omitted)	
Cod	95	[c] 55
Haddock	110	[c] 13
Ocean perch	38	20
Silver hake	236	236
Red hake	[d] 132	[d] 97
Pollock	[d] 22	[d] 22
Yellowtail flounder	86	31
Other flounders	55	44
Total	774	518

[a] MSYs are based on commercial catch statistics and represent current estimates of maximum sustainable commercial catches given current recreational catch levels.

[b] Includes some area on Georges Bank which is within 200 miles of Canada.

[c] By catch only, no directed fishery.

[d] Atlantic pollock MSY is 66 million pounds off the United States and Canadian coasts and the 1977 quota was also 66 million pounds for those waters. The amount shown for the United States was estimated by NMFS.

Harvesting capability

The Fishery Conservation and Management Act of 1976 requires fishery management plans to include the capacity of the fleet and the extent to which U.S. vessels will harvest available resources. The Atlantic groundfish fleet has the capacity to appreciably increase present landings. The extent of available additional capacity and the extent to which U.S. vessels will increase their harvest of available resources, however, has not been fully determined. NMFS and a Sea Grant university are developing this information. A NMFS official explained that the fleet capacity and the amount harvested depend on a variety of factors including the number of trips made and the mix of species caught. The species mix depends on stock abundance, harvesting cost, and ex-vessel price for each species.

Less popular species provide an opportunity to substantially increase current harvests. U.S. vessels now concentrate on popular species, such as cod, ocean perch, and flounders because high prices for those species result in higher returns. Low prices or unstable prices for other more abundant species, such as red hake and silver hake make those fisheries less attractive to U.S. vessel owners. In 1974 U.S. fishermen caught 83 million pounds or 74 percent of the cod, haddock, and ocean perch caught off the Atlantic coast, while foreigners caught 323 million pounds, or 90 percent of the silver hake and red hake. If resource abundance is increased to levels approximating the MSY, silver hake and red hake would make up 331 of the 536 million additional pounds of groundfish which could become available to U.S. fishermen.

Product development and processing

Substantial capacity is available to increase fresh groundfish production. U.S. groundfish landings are sold largely in the fresh fish market, if this market is saturated the excess groundfish are then sold in the lower priced frozen fillet and steak market. Faced with reduced landings and increased frozen imports having a cost advantage, domestic fillet and steak production has declined.

As U.S. landings increase, ex-vessel prices are generally expected to decline. Increased volume will allow more efficient utilization of existing processing facilities and lower production costs. Processors then will be in a better position to invest in new equipment and will also be better able to compete in frozen markets with imported products. An industry official believes that rising costs in Canada will also improve the competitive position of U.S. processors.

Marketing potential

As resource abundance increases, U.S. processors will be able to increase sales of traditional products in existing fresh fish markets. Markets for popular species such as cod, haddock, and flounders are strong, but limited supplies have hindered market expansion. NMFS and industry officials also believe that U.S. processors will be better able to compete with imports in the large domestic market for frozen fillets and that U.S. processors may be able to produce fish blocks at prices competitive with imports.

Opportunities also exist to develop new markets and export markets for underutilized groundfish. For example, an NMFS program to develop fisheries for underutilized resources sponsored a European marketing study which evaluated market factors in Western Europe for several underutilized species, including silver hake. The study estimated that the European import market for hakes is about 230 million pounds.

OBSTACLES TO GROWTH AND DEVELOPMENT

Resource availability and management controls

Overfishing, due to inadequate management controls and a lack of timely action to conserve fishery resources, has been the most important reason for reduced resource availability. The lack of precise data has also contributed to the problem.

As noted previously, heavy fishing pressure by both U.S. and foreign fishermen during the 1960s and early 1970s resulted in major declines in groundfish abundance. In 1969 ICNAF adopted catch quotas for haddock and during the early 1970s improved attempts to control fishing effort by adopting catch quotas and country allocations, size limits, mesh regulations and area closures. By 1974 quotas were enforced on all species either singly or in groups and a total quota for all species was set at a level less than the sum of the individual quotas. The Fishery Conservation and Management Act of 1976, by extending U.S. exclusive jurisdiction over groundfish resources to 200 miles off U.S. coasts, provides the frame work for more effective resource management control.

Because groundfish species intermix, several species are usually caught when trawling. Also, small groundfish are caught in small mesh nets used in other fisheries, such as the shrimp fishery.

NMFS biologists believe that the incidental catch during trawling operations is a serious problem contributing to the reduced abundance of some groundfish stocks, and that management must recognize interactions between species. For example, small haddock are sometimes caught in the silver hake fishery, while large amounts of small silver hake are believed to be caught and discarded in the shrimp fishery. Incidental catch in the ocean perch fishery has included other groundfish species such as cod, haddock, and silver hake. An estimated 20 to 30 percent of catches in New England are discarded at sea and thus are not reported in landings statistics.

Conservation of the resources requires enough data to be able to predict the effect of different catch levels on each species and to understand the interrelationships among species. A good data base is even more important when managing at the level of optimum sustainable yield. There is enough data available to implement regulations to increase the abundance of groundfish species, but there is insufficient data to manage at optimum levels.

NMFS research, with limited resources, has focused mainly on species of primary interest to U.S. fishermen. As a result there is relatively little data available for some species such as red hake, silver hake and sand flounders. Data on red hake and silver hake has been obtained primarily from the Soviets, who account for most of the catch of these species. NMFS biologists question the reliability of silver hake data because they have not reviewed Soviet sampling methods, and because large numbers of young fish are believed to be caught but not included in their samples. With the decline of the yellowtail flounder fishery some fishermen have begun landing sand flounders. According to NMFS biologists (1) very little information is available about sand flounders and (2) it is unknown how much fishing effort can be applied without depleting the resource.

Harvesting capability

A 1972 NMFS study of the New England groundfish industry found that about 44 percent of the groundfish trawlers were operating at a loss due to high operating costs; depletion of species, such as haddock and yellowtail flounder; and increased competition from imports produced by subsidized foreign fleets. The study concluded that the return on investment in the New England groundfish industry declined during the 1960s and appeared to be the lowest in any U.S. fishery. Low return on investment was cited by a NMFS official as the underlying reason for the lack of maintenance on many New England groundfish vessels.

High costs for insurance, fuel and fishing gear, as well as reduced catch rates were cited as continuing problems. An industry official agreed that while some vessels have been able to earn a reasonable profit many vessels have operated at a loss or have received very low returns even though gross revenues have increased.

The common property nature of the resource is also a problem. While increased resource availability could lead to improved returns for groundfish vessels, industry and NMFS officials stated that fishing effort will have to be limited. Some form of limited entry may be needed to obtain maximum benefits from improved resource management.

Because of low returns, unstable resource conditions and high investment risks in the groundfish industry, vessel financing has been difficult to obtain. While the Fishery Conservation and Management Act of 1976 provides the basis for solving many of the economic and institutional problems leading to the decline of the groundfish industry, some industry officials believe that Federal assistance for vessel financing will be needed until the problems are solved.

Product development and processing

Beyond the problem of increasing the abundance of popular domestic species, other factors affecting the potential for product development and processing include technological processing problems and the need for large capital investments in modern processing and freezing facilities.

Groundfish meat yields from filleted fish could be increased from the current levels of about 30 percent to about 50 percent, according to a study of productivity in the processing industry, by using meat separating machines to remove flesh from filleted carcasses. However, while these machines are available and are used extensively by foreign processors, most Atlantic groundfish processors do not use them. The limited use of these machines is related to the low price of the product produced, the lack of volume production by domestic processors and the strong competition from imports. As depleted stocks recover and domestic processors increase the volume of production, their competitive position is expected to improve in relation to imported products.

Even with strong foreign competition, NMFS and industry officials believe U.S. processors may be able to produce minced blocks made from silver hake which is underutilized by U.S. fishermen. Processors have produced and sold minced silver hake blocks but loss of product quality during frozen

storage made the product unacceptable. NMFS is developing methods to extend the product's shelf life. Resulting processing improvements for minced silver hake may also be applicable to other species having shelf life problems.

Production of frozen fish products requires extensive investments in processing and freezing facilities. If U.S. production of frozen fish products is to increase appreciably, large investments in machinery and facilities will be needed according to NMFS officials. Domestic processors have not invested heavily in frozen fish production facilities because of the competitive position of imports and reduced supplies.

Marketing potential

Expansion of fresh fish markets has been limited by the reduced abundance of the most highly favored species. High transportation costs to inland markets and lack of information on product distribution channels and wholesale prices were also cited as problems.

Additional factors affecting potential for market development include the need for extensive marketing efforts that may be required to overcome consumer reluctance to purchase less popular groundfish species and the need to improve the quality of some groundfish products. A NMFS marketing official stated that consumers generally want mild tasting, white-fleshed fish and that they are reluctant to buy unknown or unattractive species or species with unappealing names such as dogfish. The need to improve the quality of groundfish was illustrated by a study of Western European market potential which noted that U.S. fish products have a reputation for being of lower quality, and that U.S. exporters can expect to meet strong competition from other exporting countries as well as from European processors. Price, quality, and consistent supplies are key competitive elements.

EFFECTS OF A 200-MILE LIMIT

More effective management is needed to assure improved resource availability to U.S. fishermen. The Fishery Conservation and Management Act of 1976 provides an opportunity for improved groundfish management through extension of U.S. jurisdiction over fisheries resources to 200 miles off U.S. coasts and by the creation of the Regional Fishery Management Councils. There is, however, still a potential jurisdiction problem related to control of the northeast portion of Georges Bank, a highly productive fishing ground off the New England coast but partially within 200 miles of the Canadian coast. Establishment of boundaries based on

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equidistant lines between the Canadian and United States coasts would result in Canadian control of the northeast portion of Georges Bank. U.S. officials contend that Georges Bank is an extension of the U.S. Continental Shelf and therefore should be under U.S. control. The disputed area is a major groundfish spawning ground.

APPENDIX III

GULF STATES GROUNDFISH

The Gulf States' groundfish consist principally of red snapper, grouper and croaker. All three are food fish, but croaker also has industrial uses. Recreational fishermen heavily fish all three species.

The major fishery is the red snapper and grouper, which is one of the oldest commercial fisheries in the gulf and one of the more valuable (fifth in Gulf States).

The croaker industrial activity, which began around 1952, produces a large volume of low-value fish, less than 3 cents a pound. Croaker is considered to have one of the highest potentials for expansion and development in the gulf.

RED SNAPPER AND GROUPER

The red snapper and other similar snappers, together with groupers are caught in the same fishery on handlines (snapper reels) on offshore banks throughout the northern and eastern gulf and Campeche Grounds.

At least 17 species of snappers and 15 species of groupers are caught in this fishery, although not all species are caught on all parts of the grounds. The predominant species in the catch are the red snapper and the red grouper. At least 11 species of snappers caught in the gulf are marketed as red snapper, with additional species from the Caribbean Sea. Although snapper and grouper are the target of the handline fleet, many other species are also included in the bycatch. Squirrelfish and bigeye have been marketed as red snapper.

Similar commercial landing patterns are expected for snapper and grouper, since both are usually fished with the same gear and at similar locations. In addition, the economic incentive for snapper fishing is expected to also influence grouper landings. Red snapper is a more valuable species and thus increases the fishing effort for red snapper, influences higher prices, and causes increases in grouper landings because of complementary production.

The fishery is not regulated or managed.

Snapper and grouper are bottom-living, slow-growing fish largely confined to the Continental Shelf. They are found most abundantly near rocky areas where nets are impractical.

As fishery pressure increased and the grounds initially and successfully fished became less productive, fishery activity expanded from the Gulf of Mexico into new areas.

The fishery grounds now include waters off the South Atlantic coast of the United States, the Bahamas, the Gulf of Mexico, and the western Caribbean.

Snapper and grouper are fished from depths of a few fathoms to about 140 fathoms. The 15- to 60 fathom-depth range is the most heavily fished and the most productive. These areas lie generally beyond 12 miles from the coastline.

This fishery is considered under intensive use. The volume of production has declined since a peak commercial year in 1965 (25.8 million pounds). The size of the fish caught has been getting smaller; however, the recreational catch appears to be steadily increasing. An estimate of the recreational catch in 1970 was pegged at 82.7 million pounds.

Also in the 5-year period 1971-75, Cuban vessels working off Florida harvested from 3.5 to 5 million pounds a year.

The lower catch rates and smaller size of fish suggest that certain stocks of snapper and grouper may be in danger of overexploitation. Furthermore, traditional fishing grounds of United States commercial fishermen are diminishing as foreign countries extend their jurisdictions.

The reported declines in catch for each fishing craft may indicate real declines in snapper and grouper abundance, or U.S. commercial fishermen are obtaining smaller portions of the available stocks, or both. The U.S. snapper and grouper fishery, caught in the squeeze between costs and returns, is finding it difficult to operate successfully, particularly on distant fishing grounds.

Most of the U.S. commercial catch is taken beyond 12 miles off the U.S. coast in the Gulf of Mexico. Extending the fishery jurisdiction to 200 miles gives the United States exclusive control of the snapper-grouper grounds.

Analyzing the multispecies snapper-grouper fishery is complicated by the lack of catch information from U.S commercial and recreational fishermen and foreign fishermen, who use different methods of capture. Catch and associated effort data are not generally available, and the species and size compositions of the catch (which includes up to 32 species of snappers and groupers) are not known with any precision.

The fish are caught in State, Federal, and international waters, through which the fish stocks move. Therefore, research necessary for management should be coordinated under the State-Federal Fisheries Management Program and an international regional fisheries organization, such as the Western Central Atlantic Fisheries Commission.

STATUS OF THE FISHERY

Current Harvest

The 1974 commercial catch totaled 18.3 million pounds, valued at $9.5 million dollars. This fishery in 1972 ranked seventh in volume and fifth in value among the Gulf States fisheries.

The trend in U.S. landings of snapper and grouper has been declining since 1965. Annual commercial landings of snapper and grouper combined reached a peak of 25.8 million pounds in 1965, followed by a gradual decrease to 17.6 million pounds in 1973. From 1965 to 1973, snapper landings declined from 15.9 to 11.0 million pounds and grouper landings declined from 9.9 to 6.6 million pounds.

The commercial landings of snapper and grouper are greatest in Florida, which accounted for 59 percent of the snapper and 89 percent of the grouper landed in 1973. On the South Atlantic coast of the United States, the annual snapper catch has been constant at about 2 million pounds and the grouper averages about 1 million pounds annually.

In the shelf area off west Florida, the Cuban bottom longline fleet in 1973 caught an estimated 5 million pounds.

The following table shows the U.S. Gulf States commercial catch for selected years.

Year	Snapper		Grouper		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
	(thousands)					
1950	7,948	$1,851	6,839	$ 629	14,787	$2,480
1955	10,251	2,574	5,569	568	15,820	3,142
1960	11,996	3,039	6,859	774	18,855	3,813
1965	15,862	4,550	9,950	1,072	25,812	5,662
1970	11,422	5,071	8,637	1,573	20,059	6,644
1971	11,302	5,334	8,081	1,555	19,383	6,889
1972	11,355	6,097	8,071	2,037	19,426	8,134
1973	11,022	6,561	6,620	1,896	17,642	8,457

The 1973 landings, by State, follow.

State	Snapper	Grouper	Total
	(millions)		
Florida	6.5	5.9	12.4
Mississippi	2.3	-	2.3
Alabama	1.0	.2	1.2
Texas	.8	-	.8
Louisiana	-	-	-
Total	10.6	6.1	16.7
Other	.4	.5	.9
Total	11.0	6.6	17.6

Snappers and groupers landed at certain U.S. ports are often captured on grounds remote from the port of landing. Therefore landings, by State, are not always indicative of the production of each State's waters or of particular fishing grounds.

Preliminary data for 1974 shows that 1.4 million pounds were caught from 0 to 3 miles; 2.5 million pounds, from 3 to 12 miles; and 13 million pounds, from 12 to 200 miles off U.S. shores. About 1.4 million pounds were caught off Mexico and in the Caribbean Sea, combined. Both production and value are greatest from the high seas beyond 12 nautical miles.

Products and processing

Important ports of landing for snapper extend from northeast Florida to south Texas: the three major snapper port areas are Pascagoula, Mississippi and Panama City and Key West, Florida. Ports of landing for grouper extend primarily from Key West to Pascagoula; the three major ports are Madeira Beach, Fort Myers Beach, and Bradenton, Florida.

The major center for processing the gulf snapper and grouper catch is Pascagoula. Snapper and grouper are cleaned, gilled, gutted, and iced immediately after being caught.

When landed the catch are transferred from vessel to conveyer belts which carries the fish through a wash. This is the extent of mechanization for this fishery. The fish are hand graded and packed in 100-pound lots, with or without heads, and shipped either fresh or frozen. An alleged problem with frozen snapper flesh is that it turns brown in about 3 months.

Markets

Snapper and grouper are marketed mostly as fresh fish with some going into frozen fillets. The products are

shipped to fresh fish markets and to institutional retail markets.

In terms of commercial prices, red snapper is about twice as valuable as grouper. The average U.S. red snapper price increased from 24 cents a pound in 1952 to 56 cents a pound in 1972. Average grouper prices increased from about 10 cents a pound in the early 1950s to 26 cents a pound in 1972.

As with many fisheries in recent years, the total value (amount paid to the fishermen) of the landings has increased, despite decreased total landings. The exvessel price for each pound of snapper has increased markedly since 1965 and for grouper since 1971.

The levels of imports of red snapper and grouper are also important in determining price through their effect on the available supply on the market. Imports of acceptable quality to satisfy domestic consumers will be important as long as they can be purchased at a price equal to domestic prices or at a price lower than that paid for domestic landings. Existing import data on both snapper and grouper are not of a quality to be useful in econometric analyses because data has not been continuously recorded over time at each U.S. port. In addition, the numerous product forms imported makes comparable measurements of the total pounds of snapper and grouper imported difficult.

The recorded imports of snapper into the Gulf States from 1952 to 1972 are shown on the following page.

A large portion of the imported red snapper and snapper fillets enter at Port Isabel-Brownsville, Texas. Miami, Florida, is the leading port for grouper imports and Port Isabel-Brownsville is second. In several of the most recent years, Miami appears to have increased its role in importing snapper fillets.

Grouper imports recorded have also been considerable and in a similarly diverse product form as red snapper. Import classifications include grouper, grouper fillets, steaks, chunks, chips, throats, fingers, heads, and breasts. For the 1952-72 period, grouper fillets imported totaled 13.1 million pounds, whereas steaks and grouper totaled 0.92 and 0.48 million pounds, respectively. Annual imports of grouper fillets have ranged as high as 3.0 million pounds (1972) and have been the most consistent product form imported. Since 1968 steak imports have not been recorded and grouper imports lessened, whereas grouper fillet imports have remained substantial.

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Year	Product form: Snapper	Fillets	Red snapper	Red snapper fillets	Other (note a)
	(thousands)				
1952	-	-	713.6	-	-
1953	-	-	759.5	-	-
1954	-	-	768.8	-	-
1955	-	-	724.7	-	-
1956	-	-	730.9	0.6	-
1957	-	-	589.6	24.4	-
1958	-	-	587.6	12.8	-
1959	-	202.0	314.9	12.9	-
1960	-	-	243.8	230.7	-
1961	-	376.4	513.4	-	-
1962	-	60.4	563.8	80.5	-
1963	-	25.9	576.1	168.5	25.2
1964	-	73.8	1,063.7	93.7	3.6
1965	-	142.5	896.8	360.8	9.9
1966	-	163.1	719.7	484.0	25.2
1967	-	94.0	566.2	272.2	19.3
1968	-	435.1	185.7	-	-
1969	2.0	392.4	339.1	-	.7
1970	20.6	358.4	363.9	-	-
1971	5.3	142.0	183.4	-	1.2
1972	141.1	12.2	208.7	299.3	71.0
Total	169.0	2,478.2	11,613.9	2,040.4	156.1

a/ Includes red snapper steaks, throats, flanks, and dressed.

Fishing fleet

Most (96 percent in 1971) of the snapper and grouper in the commercial catch are taken by the so-called handline fleet. The vessels are usually diesel powered and range from 26 to 79 feet in length. Many still retain the lines of the traditional snapper schooners, are masted, and use a small riding sail for the steadying effect while fishing. The gear used are mainly baited hooks with simple handlines or mechanical reels, exclusive of trolling and longline gear. A small quantity of snapper and grouper are caught by shrimp trawls, spiny lobster traps, fish pots, haul seines, trammel nets, gillnets, and longlines.

The fishing gear used by the handline fleet varies with the location fished and the species and sizes to be caught.

From 2 to 40 baited hooks may be used with each reel line, but individual handlines sometimes have only 1 hook. The hooks used are both conventional style and self-hooking tuna-circle style. For bait, several species of fish, shrimp, and squid are used.

Most of the fishing craft use ice to preserve the catch, but a few are equipped with freezers. Some of the craft are of multipurpose design to facilitate use in other fisheries, such as shrimping and lobstering. For example, about 25 percent of the handline vessels operating from South Atlantic and Gulf States in 1969 were equipped with additional types of gear in addition to those classified as handlines, which were primarily mechanical reels. Included in the numbers of commercial handline craft reported are an unknown number of sport, charter, and party craft from which fish were sold and reported to NMFS statistical agents. Therefore all of the craft reported as handlines are not only used in the snapper and grouper fishery. The usual purpose of such diversification is to operate profitably throughout the year. For the same reason, many of the snapper-group fishermen are part time and are active in other fisheries or occupations.

In 1971 the commercial handline fleet operating at least part time from the Gulf States was made up of 397 vessels and 1,570 boats. About 83 percent of the vessels and 76 percent of the boats were based in Florida. The boats are generally less than 26 feet long.

In the northwestern Gulf of Mexico off Texas, relatively few boats in 1972 were involved solely in commercial fishing for red snapper.

A relatively small portion of the U.S. snapper-grouper fleet participates in the fishery off the South Atlantic coast. In 1971 there were about 56 vessels and 398 boats operating in the handline fleet along the South Atlantic coast, with most of these craft based along the Florida east coast. There is some seasonal exchange of handline vessels between the South Atlantic coast and the Gulf of Mexico.

The total number of commercial vessels increased from 138 in 1953 to 406 in 1971, with a maximum of 546 in 1959. The number of commercial boats has declined from 3,290 in 1956 to 1,602 in 1971.

In the Gulf of Mexico off the United States, the smaller snapper-grouper craft that fish these waters are based at nearby ports along the gulf coast and make 1- to 12-day trips.

The larger, traditional snapper vessels are based mainly in the vicinities of Panama City, Florida; Mobile, Alabama; and Pascagoula, Mississippi, and remain at sea for up to 3 weeks. These vessels are capable of operating anywhere in the Gulf.

We were told that the commercial fleet included many old shrimp vessels that were not kept in a state of good repair.

The newer vessels added to the fleet in 1965 were 70 to 80 feet long, equipped with refrigeration, and designed for multipurpose fishing. Fishing methods changed with vessel improvements. Cotton handlines were replaced by stainless steel lines and reels. Experimental otter trawls have been modified for snapper fishing and shown to be more effective than hook and line, but they have not yet been adopted.

A study in 1973 for NMFS evaluated the fleet as old and in need of upgrading. The vessel segment of the fishery has been in a generally depressed condition for many years, and financial returns have not been great enough to encourage vessel or personnel upgrading.

The study expresses reservations about the value of upgrading vessels, because basic vessel productivity is related to the number of reels and lines used and replacement of vessels cannot greatly improve the economic climate for the harvesting sector.

Employment

We were told that the average age of the snapper-grouper fisherman is 55. Crew incentive is low because of the poor state of the vessels, which are often out of service. As a result, catch levels are low, shares are low, and crew quality is the lowest among the gulf fisheries.

The numbers of persons in the fishery are not known. All craft reported as handliners are not consistently used in this fishery. The usual purpose of such diversification is to operate profitably throughout the year. For the same reason, many of the fishermen are part time and are active in other fisheries or occupations.

Recreation fishing

Estimates of the recreational catch of snapper and grouper are 82.7 million pounds landed in 1970, the year of the most recent survey. By species, the recreational

catch was groupers, 41 million pounds; yellowtail snapper, 21 million; red snapper, 17.3 million; with the remainder being other kinds of snapper. These data indicate that, while red snapper make up the largest part of the commercial catch, grouper and yellowtail snapper are important to the sport fisherman. Although these estimates contain unmeasured sampling and response errors, the magnitude of importance of the recreational catch cannot be ignored. Premium commercial prices paid for red snapper and accessibility to yellowtail snapper and grouper fishing areas are primary reasons for the catch differences between the commercial and recreational grouper-snapper fishery.

Recreational fishermen and their craft have increased in numbers in the last two decades. In 1973, 986,000 private and commercially operated recreational craft, more than 16 feet in length, fished in the salt waters of the South Atlantic and Gulf States. In the gulf, snappers and groupers were among the primary species sought by the operators of these craft.

Management controls

The snapper-grouper fishery is not a regulated or managed fishery. We were told that no specific State regulations are known which apply directly to this fishery.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

The snapper-grouper fishery is considered under intensive use. Little information is available on the life history and population dynamics of this fishery. No MSY estimates have been made.

In 1968 the latent fishery resource for the Gulf of Mexico was estimated at about 1 billion pounds.

Using the 1968 data and FAO data published in 1971, we extrapolated a resource level of about 250,000 million pounds for the Gulf of Mexico.

Harvesting capability

The capability of the industry seems to be flexible, but difficult to assess. The overall trend in the size of the fishing fleet (i.e., numbers of vessels and boats) has been one of decline since the middle and late 1950s.

Fishermen, some of whom are part time, move in and out of the fishery as economic conditions change in other fisheries in which they work or within the snapper-grouper fishery.

In the northwestern Gulf of Mexico, shrimp fishermen, at times, fish for snapper by hook and line during slack shrimping periods.

New vessels entering the fleet may be increasing the overall industry harvesting capability, even though the number of vessels is decreasing because of the size of the new vessels, but this kind of comparative data is not available. Future harvesting capability is not known.

Product development and processing

At the present time there appears to be no need for developing new forms of snapper-grouper products since all the commercial catch is readily marketed.

The processing method now is a rather simple, unsophisticated process--a combination of conveyor belt and manual handling. This processing method does not appear to be a drawback to meeting market demands.

Research efforts to improve processing methods are not being programed.

Marketing potential

There is a ready market for snapper and grouper. Low production is the limiting factor. The volume of imports indicates that increased production could be marketed if prices were competitive.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

The decline in commercial catch in recent years indicates resource problems related to increased fishing pressure by commercial, recreational, and foreign-flag fishermen. Furthermore, grounds historically fished by U.S. fishermen are diminishing as the Bahamas, Mexico, and the Caribbean nations extend fisheries jurisdictions.

Industry operators think that overfishing is causing decreasing harvest levels. In 1974 the harvest was bad, particularly because of rugged weather in the summer and fall. The average size of fish caught is now only 3 to 3½ pounds compared to 6½ pounds 10 years ago--an indication, fishermen think, of overexploitation.

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Catches in the northwestern Gulf of Mexico by Texas fishermen have declined since 1965 by about 50 percent. Texas fishermen suggest that the shrimpers' increased trawling speed and more efficient trawls are capturing more young snappers than in the past. They believe that discarding these young snappers was the cause of the decline in the snapper fishery. Similar comments were reported by Florida fishermen in 1963. The total snapper catch for the Gulf of Mexico off the United States has remained relatively steady since 1961, but catches per vessel have decreased.

A recent study by the State of Texas of the red snapper fishery in the northwestern Gulf of Mexico for the 1970-74 period found that the catch per effort and total effort by commercial fishermen have declined, while sport fishing for the species has increased. Shrimp fishermen marketed the larger snappers captured in trawls and discarded the smaller ones. Pressures applied to the fishery have adversely affected commercial landings on the Texas coast.

Definitive assessment of this fishery's stock and/or potential yield is not possible with the available data.

Harvesting capabilities

The capabilities have existed to harvest the crops close in, but as harvest areas began to move farther from the coastline and quantity of harvest per craft decreased fishermen were caught in the squeeze between costs and returns.

The capability to harvest is assumed to exist but limited by economic costs and returns constraints. The effort to harvest this fishery will be directly related to the level of exvessel price.

Fishermen on relatively small boats, who fish from 50 to 100 miles offshore, reported a decline in average size of the fish from about 3 pounds 5 years ago to less than 3 pounds currently. Distant water fishermen said that the average size of the fish is thought to have declined from about 5 pounds to about 2 to 3 pounds currently. Party boat owners indicate the same trend and feel that the dockside value of the average catch is less than sport fishermen's cost. In addition to the smaller size of the individual fish, boat captains state that longer fishing days and more trips are necessary to catch the same amount.

A fisherman in the northwestern Gulf of Mexico off the Texas coast stated that searching for fish took 95 percent of the time, whereas actual fishing time was about 5 percent.

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We were told that some commercial fishing captains want to make only a limited number of trips each year because of high taxes, and commercial crews do not like to stay out more than 7 days at a time. A study for NMFS concluded that a breakthrough in the efficiency of the fishing technique itself is required; that is, innovative gear and equipment to increase vessel productivity and/or reduce crew size are needed.

Product development and processing

Product development and processing are not obstacles for this fishery because there is a ready market for snapper and grouper.

Market development

The market for snapper and grouper is substantial; however, the decreased commercial harvest has limited the quantity available.

Management controls

There are no management controls.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

The extended jurisdiction will convert this fishery to essentially a domestic fishery, which will include the shelf area fished.

From 1971 to 1973, as many as 25 Cuban vessels fished each month on the west Florida shelf for snappers and groupers. For 1971, 1972, and 1973, annual catches were estimated to be 4.0, 3.7, and 4.9 million pounds, respectively.

PACIFIC GROUNDFISH

Groundfish is the name applied to a group of fish that live on or near the ocean bottom. Most groundfish, or bottom fish as they are sometimes called, are caught by the use of trawl nets.

The principal U.S. bottom fish fishing grounds are located over the Continental Shelf of the Northwest Atlantic and the North Pacific coast. Over three-fourths of the U.S. groundfish catch is landed on the east coast, chiefly at New England ports.

The major Pacific coast groundfish species of commercial or potential interest, excluding halibut--discussed in a separate section of this report--include cod, flounders, hake, lingcod, Pacific Ocean perch, pollock, rockfishes, and sablefish. In 1973 California landings of groundfish totaled over 66.9 million pounds, followed by Washington, Oregon, and Alaska with 40.5 million pounds, 22.2 million pounds, and 3.3 million pounds, respectively.

The various species known as flounders have provided by far the greatest tonnage and dollar income to commercial west coast fishermen. Rockfishes are the next most important groundfish. Several species, such as pollock and hake, which are caught only in small quantities by the U.S. fishing fleet, have the potential of becoming important to west coast markets.

STATUS OF THE FISHERY

Current harvest

Landings of Pacific coast groundfish are largely influenced by market demand rather than species availability; that is, only certain species are retained from the total catch. Fishing is done at specific times and locations where desirable species are known to occur. For this reason, landings of groundfish in the coastal waters where the fishery now exists cannot be used to assess the relative abundance of species exploited.

Before World War II, the dominant species of flounders caught were petrale sole and English sole. After World War II, demand for food fish resulted in the expansion and rapid diversification of trawl fisheries to include a wide variety of other flounders, rockfishes, and other groundfishes. The

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development in 1946 of the Pacific Ocean perch fishery resulted in increased harvests of deepwater rockfishes. Pacific cod catches by trawlers increased rapidly following the development of "fish sticks."

In 1973, the latest year for which complete fishing data was available by State, about 133 million pounds of groundfish were landed at Pacific coast ports with a value of $13.8 million (table 1). The California catch comprised a little more than 50 percent of the total volume of the four States. Table 2 shows the total tonnage and dollar value of Pacific Coast groundfish, excluding hake, between 1960 and 1973. Table 3 contains the most current summary data showing the volume of groundfish caught on the west coast and the distance caught from shore.

Table 1

Landings of Groundfish by State

for 1973

Species	Alaska		Washington		Oregon		California		Total	
	Weight (note a)	Value	Weight (note a)	Value	Weight (note a)	Value	Weight (note a)	Value	Weight (note a)	Value
	(000 omitted)									
Cod	158	$ 37	7,747	$ 703	514	$ 45	-	$ -	8,419	$ 785
Flounder	992	72	8,466	1,039	12,497	1,427	32,550	3,913	54,505	6,451
Hake	-	-	2,482	37	78	4	34	1	2,594	42
Lingcod	91	21	2,402	253	2,326	212	3,559	389	8,378	875
Pacific Ocean perch	-	-	5,862	500	566	50	-	-	6,428	550
Pollock	-	-	109	8	-	-	-	-	109	8
Rockfish	189	35	12,873	983	4,924	361	22,216	2,310	40,202	3,689
Sablefish	1,911	473	578	111	1,327	155	8,550	661	12,366	1,400
Total	3,341	$638	40,519	$3,634	22,232	$2,254	66,909	$7,274	133,001	$13,800

1/ Expressed in pounds.

Source: Fishery Statistics of the United States, 1973
National Marine Fisheries Service.

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Table 2

U.S. Landings and Exvessel Value of Pacific Groundfish, 1960-73 (note a)
(round weight)

Year	Quantity (note b)	Value
	--------(000 omitted)---------	
1960	108,434	$ 6,573
1961	102,818	6,142
1962	114,510	7,099
1963	117,530	7,493
1964	107,394	6,926
1965	120,604	7,523
1966	119,363	7,936
1967	108,596	7,418
1968	103,166	7,053
1969	110,385	7,746
1970	104,658	8,168
1971	97,773	8,641
1972	124,840	11,575
1973	130,407	13,758

a/ Includes cod, flounder, lingcod, Pacific Ocean perch, pollock, rockfish, and sablefish. Does not include hake.

b/ Expressed in pounds.

Sources: U.S. Department of Commerce
Basic Economic Indicators
Atlantic and Pacific Groundfish, 1932-1972

Fishery Statistics of the United States, 1971, 1972, 1973.
National Marine Fisheries Service

Table 3

Commercial Landings of Groundfish By U.S. Fishing Craft: 1975

Species	Distance caught off U.S. shores: 0 to 3 miles		3 to 12 miles		12 to 200 miles		Caught in international waters off foreign shores		Total	
	Weight (note a)	Value	Weight (note a)	Value	Weight (note a)	Value	Weight (note a)	Value	Weight (note a)	Value
	(000 omitted)									
Pacific cod	2,316	$ 264	2,467	$ 273	5,834	$ 669	1,205	$139	11,822	$ 1,345
Pacific flounders	6,243	922	19,590	2,809	21,783	3,116	2,693	404	50,309	7,251
Pacific hake	3,301	49	86	3	-	-	-	-	3,387	52
Pacific Ocean perch	25	2	2,148	221	4,939	501	-	-	7,112	724
Pollock (note b)	1,692	122	3,742	413	13,305	1,679	1,875	262	20,614	2,476
Rockfishes (note b)	3,929	761	17,507	3,135	11,853	1,488	1,608	160	34,897	5,544
Sablefish (note c)	-	-	-	-	-	-	-	-	-	-
Lingcod (note c)	-	-	-	-	-	-	-	-	-	-
Total	17,506	$2,120	45,540	$6,854	57,714	$7,453	7,381	$965	128,141	$17,392

a/ Expressed in pounds.

b/ Total U.S. catch.

c/ Data not available.

Source: Fisheries of the United States, 1975. National Marine Fisheries Service.

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Products and processing

There are 49 Pacific coast processing plants which process fresh groundfish for fillets and steaks. California has 21 such plants, Oregon 15, Washington 13, and Alaska 0.

The groundfish market in Washington and Oregon is a fresh fish market. In these States, fish are landed at processing plants where they are filleted and either sold on the local fresh fish market or shipped out of State. Most of the shipped fish are air freighted to major metropolitan areas such as Los Angeles and San Francisco. An Oregon industry spokesman stated that as much as 75 to 85 percent of their catch is air freighted out of State. Processors in Washington and Oregon freeze only those fish which are spoiling.

During the winter months, most of the groundfish caught in California are sold on the fresh fish market. At this time of year dealers can generally take all that are caught. In the summer, because of the large quantities of groundfish caught, the market is glutted, and Northern California processors have to freeze about 70 percent of the catch. Processors south of San Francisco sell a fresh fish product most of the year.

Groundfishing in Alaska is an insignificant industry due to the economics of the fishery. Currently, most of the groundfish caught are usually caught incidental to shrimp, which are a primary target for Alaskan trawlers. Much of the incidentally caught groundfish is thrown away or is reduced to fishmeal.

Foreign fishing fleets cannot compete in the fresh fish market because they are not allowed to land fresh fish in the United States.

Processors buy frozen fish blocks from foreign countries. These blocks are partially thawed, breaded, and refrozen and the product is then sold to customers who package them as fish sticks. Much of the imported fish goes to fast food stores and other high-volume operations.

Markets

The United States is the principal market for groundfish products. This country consumed about 9 percent of the world catch of groundfish in 1972 and received 65 percent of the total world exports of fillets and blocks. In 1974 the United States produced only about 2 percent of the blocks it used (table 4).

Growth of the U.S. market for fillets and blocks has been phenomenal. In 1973 855.4 million pounds of groundfish products were consumed--practically all as fillets, steaks portions, or fish sticks. The annual market growth rate averaged 7 percent during the 5 years ending 1973, despite steady and sizable advances in price levels.

The continued rise in import volume, up almost 300 percent in 10 years, has made possible the steady growth of the U.S. groundfish market. Domestic landings have not improved, although the steady deterioration of landings was arrested during 1970-73. Thus, ever-larger volumes of import fillets and blocks have been required to meet market needs.

World demand for groundfish products has placed a biological and economic strain on the supplies of traditional species. As a result, the composition and source of U.S. imports is undergoing a considerable change. The composition (by species) and source (by country of origin) of U.S. fillet and block imports during 1968 and 1973 are compared in table 5.

Fifty-eight percent of U.S. block imports during 1972 were cod and 15 percent were pollock. These shares shifted to 43 percent and 29 percent, respectively, during 1973. Cod blocks traditionally have been the preferred raw material for portions and sticks. The growing cod shortage, however, has forced increasing dependence on other species, especially Alaska pollock.

Table 4

Supply of Blocks, 1967-74

Year	U.S. production		Imports		Total supply quantity (note a)
	Quantity (note a)	Percent of total supply	Quantity (note a)	Percent of total supply	
1967	9,004	4.5	189,504	95.5	198,508
1968	4,235	1.6	261,086	98.4	265,321
1969	3,497	1.3	266,748	98.7	270,245
1970	3,892	1.4	272,655	98.6	276,547
1971	6,186	2.0	311,166	98.0	317,352
1972	3,508	1.0	355,459	99.0	358,967
1973	9,865	2.7	[b] 358,730	97.3	[b] 368,595
1974	4,621	1.7	266,073	98.3	270,694

[a] Expressed in thousands of pounds.

[b] Record.

Source: Fisheries of the United States, 1974
National Marine Fisheries Service.

Table 5

U.S. Imports Of Fillets and Blocks

1968 and 1973 (note a)

Species	1968	1973
	(000,000 omitted)	
Cod	223.1	237.9
Haddock	55.6	75.8
Atlantic perch	50.5	88.4
Flatfish:		
Atlantic	53.6	75.6
Pacific	-	55.3
Wolf fish	7.3	7.5
Pollock:		
Atlantic	8.4	41.9
Alaska	3.1	62.2
Unclassified	35.5	47.8
Total	[b] 437.0	692.4
Source		
Canada	214.9	228.0
Norway	42.8	69.4
Denmark, Greenland, and Faroe Islands	38.4	89.7
Iceland	82.2	110.7
Japan	3.3	133.2
Other countries	55.3	61.5
Total	[b] 437.0	692.5

[a] Expressed in pounds.

[b] Sum does not add due to rounding.

Source: Indian Ocean Fishery Commission, United Nations Development Programme, 1974, vol. 40.

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Exvessel prices paid for groundfish vary by species, size, dressed or round weight, season, and location. Groundfish landed at Puget Sound ports in Washington generally sell for less than similar species landed in San Francisco or Eureka, California. Listed in table 6 are the exvessel prices paid for various groundfish landed at Puget Sound ports in early 1976. Large, dressed, black cod (sablefish) was the highest value fish, bringing 27 cents per pound, followed by petrale sole at 24 cents per pound.

Table 6

Price List
Fishermen's Marketing Association of Washington
(As of January 20, 1976)

Species	Price per pound
Petrale sole	$ .24
Sand sole	.18
English sole	.14
Dover sole (14" and over, 3% slime allowance)	.13
Rock sole (13" and over)	.19
Rex sole	.13
Rock cod:	
Ocean run	.105
Red	.115
Ocean perch	.115
Flounders	.08
True cod:	
Round	.125
Dressed	.23
Lingcod:	
Round	.125
Dressed	.23
Black cod:	
Round, under 8 pounds	.13
Dressed, under 5 pounds	.22
Round, over 8 pounds	.18
Dressed, over 5 pounds	.27
Alaska pollock	.08
Minor species, such as skate, etc., handled on a local basis	≥.07

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Fishing fleet

The trawl net is the predominant commercial gear used worldwide for catching groundfish. The trawl net is towed through the water, on or close to the bottom, by any one of a variety of large and small fishing vessels.

One major exception to the trawl fishery is the longline halibut fishery of the northeastern Pacific, where trawls are barred to U.S. and Canadian fishermen. Other gear is also used by U.S. vessels to catch groundfish. Pots and traps are commonly used for sablefish; gillnets, troll, handline, purse seine, and beach seine gear are also used to catch groundfish.

Trawling in the North Pacific Ocean began in the early 1930s and is a relatively young industry compared to the salmon and halibut fisheries which were already well established at the turn of the century.

Most U.S. and Canadian vessels in the North Pacific are much smaller than those of other countries. U.S. and Canadian vessels operate on fishing grounds which, for the most part, are close to homeports, and catches are landed in an unfrozen, unprocessed condition. In contrast, Japanese and Soviet vessels fish far from home ports and they must have onboard processing and freezing for their extended operations.

The American west coast trawler typically is an aging boat of 50 to 75 feet, owned and skippered by one man. It works with a crew of three to five men. This small crew makes west coast trawling economically possible. Only a few larger modern trawlers are fishing on the west coast.

West coast trawlers may operate out of several coastal fishing ports with relatively short runs to fishing grounds. The only vessels making fairly long trips are those from Puget Sound ports in Washington. These boats work off the northwest coast of Vancouver Island and as far north as

Hecate Strait because of the scarcity of local productive grounds. This can involve round trips of 500 to 600 miles. We were told by the manager of a Puget Sound marketing association that 83 percent of their groundfish are caught off the Canadian coast. On the other hand, groundfishermen from Oregon and California fish relatively close to their home ports.

Although many trawl or drag vessels still fish only part of the time in the winter, there is an increasing number of year-round vessels at work.

We contacted government officials in the four west coast States to determine the number of groundfish trawl vessels in the fishery (see table 7 below):

Table 7 (note a)

Groundfish Trawl Vessels

Operating from the West Coast, 1976

State	Number of vessels
Alaska	(b)
Washington	95
Oregon	c/ 72
California	113

a/ Does not include vessels catching groundfish incidentally.

b/ Insignificant.

c/ 1974 data.

Groundfishing does not exist in Alaska. Federal and Alaska State fisheries officials told us that nearly all the trawlers registered in Alaska fish primarily for shrimp, with some groundfish taken incidentally. Only one trawler out of Alaska was reported to be operating in the groundfish fishery. This vessel was catching bait for other boats in the halibut longline fishery.

Employment

According to State and Federal sources, approximately 280 vessels were engaged in the Pacific coast groundfish fishery in 1976.

Washington, Oregon, and California industry officials estimated that the average crew size on a typical trawler is between three and five, including the skipper. Assuming an average number of four fishermen per vessel, about 1,120 west coast fishermen were working in the groundfishing industry.

The number of employees working in the 49 plants that produce groundfish fillets and steaks is not available.

Recreational fishing

Bottomfishing represents a large and rapidly increasing portion of recreational fishing on the west coast. Several reasons for the recent interest in bottom fish are: (1) more highly prized sportfish such as salmon have declined in availability, (2) bottom fish are relatively easy to catch and require little experience or specialized gear, (3) they can often be caught near major metropolitan areas, and (4) various groundfish are excellent food.

In the past few years, sportsmen in the Pacific Northwest have become interested in the potential of bottom fish for sport fishing. Bottom fish along the coasts of Oregon, Washington, and Alaska represent what may be the last major undeveloped sport fishery in the country. This resource has probably been ignored in the Northwest due to the dominance of salmon angling, and this dominance has inhibited recreational development of other fisheries. Before the early 1960s, there were few angling trips specifically for bottomfish. Nearly all bottom fish caught, including lingcod and halibut, were incidentally hooked while fishing for salmon. Between 1965 and 1970 the number of bottom fish angling trips in Washington State increased as interest in bottom fish both as recreational and food fishes grew.

The outlook in the Pacific Northwest appears to be for a continued rapid increase in bottomfishing. This forecast is due to increased population, increased awareness of the bottom fish potential, and the uncertain future of salmon angling. However, the predicted increase in fishing for species other than salmon in the Northwest accentuates the need for more research on these species. Basic facts on life history, ecology, age, and growth patterns are lacking for most of these species.

Southern California marine recreational fishermen exploit many coastal fish species. U.S. partyboat fishing, in which fishermen rent space aboard a boat for a day or half day, has been popular in southern California since the 1920s. In the last decade, partyboat fishermen have caught about 4

million fish a year. Fishing from private boats, shorelines, piers, and jetties is also quite popular, but statistics have not been routinely collected.

We were told by an NMFS official that not much has been done in the past to compile information on bottom fish because they have not been important and little funding has been available to do studies. The most recent stock assessment information has been compiled on the State of Washington in 1967 and published in 1970. Even less information is available for Oregon, California, and Alaska.

Effect on the regional economy

The groundfishing industry affects three of the four Pacific Coast States. The groundfishing industry in Alaska, as mentioned before, is not significant, although future opportunities may be great. While no specific information is available on the economic effect of the groundfish fishery, the following facts indicate its importance.

1. Statistics prepared for the International North Pacific Fisheries Commission show that 175.6 million pounds of groundfish were landed by U.S. vessels in 1974.

2. About 280 trawlers directly employing about 1,120 fishermen take part in the fishery.

3. 1975 data showed that 49 plants processed groundfish into fillets and steaks in the Pacific Coast States.

The effect on the regional economy of wholesalers, retailers, and shipbuilding and overhaul facilities must also be considered.

Management controls

Domestic

No Federal regulations exist on the taking of bottom fish in the Northeast Pacific Ocean. The individual States concerned have prime resource management responsibility. There appear to be no important State regulations that affect groundfish harvesting in Oregon, Washington, or Alaska. California, however, prohibits trawling within 3 miles of the coast and taxes nearly all landed fish at $.001 per pound; California halibut is taxed at $.01 per pound.

International

The United States is a member of the International North Pacific Fisheries Commission, which is concerned with all fishery resources in the waters of the North Pacific and adjacent seas. The International Convention for the High Seas Fisheries of the North Pacific Ocean was brought into force by Canada, Japan, and the United States in 1953 for the purpose of insuring maximum sustained productivity of fishery resources in the convention area. The convention provided for establishing the International North Pacific Fisheries Commission to promote and coordinate scientific studies necessary to ascertain and recommend conservation measures required to secure maximum sustained productivity of fisheries of joint interest.

In addition to the International North Pacific Fisheries Commission, several bilateral executive department agreements were negotiated with the Soviet Union, Japan, Canada, and other nations. These agreements were to reach an understanding with foreign fishermen so the economic interests of the U.S. fishing industry could be better protected while the rights of foreign fishermen on the high seas could also be preserved. Under terms of these agreements, the other nations have refrained from fishing in some areas of special interest to the United States in exchange for concessions to fish and transfer cargoes at several places within the U.S. 12-mile fisheries zone. In recent years, agreements with the Soviet Union, Japan, and Poland have included quotas on the catches of some species and provisions not to fish other species of particular concern to the United States. Agreements with the Republic of Korea and Taiwan do not contain catch quota provisions and prohibit only the taking of halibut among the several bottom fish species of concern to U.S. fishermen. A special feature of the agreement with the Soviet Union has been the establishment of a board to facilitate the settlement of monetary claims arising from destruction of fishing gear or the interference with fishing operations.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

The extent of habitable grounds on the Continental Shelf is one of the major factors which determines the size and potential yield of bottom fish. In the eastern Bering Sea, the shelf is one of the broadest in the world, having an average width of about 400 miles with extensive shallow areas

less than 50 fathoms deep. Over one-half of the eastern Pacific Continental Shelf extending northward from California is in the eastern Bering Sea.

Although much information on the kinds and quantities of fish and shellfish occurring in the Bering Sea and Northeast Pacific is available from research cruises and from records of domestic and foreign fishing operations, large knowledge gaps still exist.

We do know, however, that the waters of the Northeast Pacific and Bering Sea are inhabited by some of this Nation's largest and most valuable fisheries resources. From these waters, U.S. fishermen harvested in 1971-73 an annual average of 639 million pounds of fish and shellfish with an annual dockside value of $170 million. However, the harvest by foreign nations from these waters dwarfs that of the United States and accounts for about two-thirds of the foreign catch from all waters within 200 miles of the U.S. coast. Most of the foreign catch is groundfish, which is little sought after by U.S. fishermen because American fishermen are unable to successfully compete with the large foreign fleets. Waters off Alaska are the site of Japan's most important distant-water fishing grounds, accounting in 1972 for about 60 percent of that nation's worldwide distant-water catch. The Soviet Union also conducts a large and valuable fishery for groundfish off Alaska and the Pacific coast. During 1970-74, these waters contributed 26 percent of the Soviet Union's catch from the entire Pacific Ocean and 10 percent of the catch from all marine waters. More recently, the Republic of Korea, Poland, East and West Germany, and the Republic of China have commenced fishing operations off the U.S. Pacific coast.

An estimate of the potential U.S. harvest may be viewed as the sum of the foreign and domestic catches; for 1974 this was 5.75 billion pounds of groundfish. The U.S. portion of that catch was only 176 million pounds, or about 3 percent. Perhaps a better estimate of the potential harvest would include additional yields that could be obtained from underutilized and unutilized resources, such as certain species of flounders and rockfish. Also, many of the presently harvested species have been overfished and their yields could be increased with proper management.

In the spring and summer of 1974, Government and industry carried out a joint venture to survey the potential of developing a domestic fishery for Alaska groundfish. Comparing the results of this operation with surveys in the Gulf of Alaska during the 1950s and 1960s, the abundance of Pacific

Ocean perch and black cod appears to have declined while pollock has increased. The decrease in Pacific Ocean perch and black cod stocks coincides with the development of foreign fisheries. Reasons for the increase in pollock are unknown.

During 1975 NMFS conducted a survey of bottom fish and commercially important invertebrates inhabiting the Continental Shelf and upper slope of the northeastern Gulf of Alaska.

The biomass in the survey area, as estimated from the otter trawl catches, was 665.8 million pounds. Of this tonnage, 40 percent were flatfish, 26 percent were roundfish, and 4 percent were rockfish. Invertebrates, sharks, and skates comprised the remaining 30 percent. Three species--pollock, turbot (arrowtooth flounder), and snow crab--made up nearly half (48.5 percent) of the biomass estimate for the survey area.

Harvesting capability

Adequate harvesting capability--in terms of many experienced fishermen and suitable vessels--is necessary for successful fisheries development. Although a sufficient number of fishermen is available, there may not be enough vessels to develop a viable groundfish industry. Many large and recently built vessels in the Alaska shellfish fleet are based out of Seattle. Many of these are large enough and suitable for conversion to trawl for groundfish in the Bering Sea or Gulf of Alaska and are seeking alternate fisheries employment during the off seasons for crab and shrimp.

The manager of a Seattle fishermen's marketing association told us that there is vessel capacity that is not being used for the groundfish fishery because groundfish prices have been low and up until now it has not been economical to convert crab boats for bottomfishing. He said, depending on the boat, conversion costs could be around $100,000.

The manager of a fishing vessel owners' association told us that crab boats can be utilized a maximum of 7 months if they fish for three species of crab. Average utilization now is about 5 months. He stated that the capacity to fish for groundfish is available, but that markets for the fish are not. The association is therefore working with the U.S. Government and foreign governments to develop agreements for

cooperative fishing. Under such proposed agreements, U.S. fishermen would fish for the foreign interests and would receive a price per pound of fish landed. The foreign nation processes the fish and takes them home.

Product development and processing

Processing capabilities parallel harvesting capabilities. In Alaska plants have been designed to handle the traditional species such as halibut, crab, and shrimp. The labor force is also accustomed to working with these products. The Puget Sound area of Washington State has a wider capability in both physical plants and labor force as the trawl fisheries have been well established there.

An official of a large Seattle fish processor told us that it is currently not economical for U.S. processors to process groundfish into frozen blocks because they cannot compete with foreign nations. However, his company believes that U.S. technology will allow this country to compete once the 200-mile limit is in effect and after the United States takes over more and more of the frozen market through reduced competition. Some of the key factors will be the use of smaller trawlers by the United States, the use of less men, mechanical filleting, and more economical shore-based processing.

Along the Aleutian chain are located plants, some aboard vessels, that have physical facilities and refrigeration capacity adequate to accommodate changes to handle trawl-caught species. A labor force could be developed from the same group that is presently employed in shellfish processing. This is especially true if some form of mechanized processing is applied. Hand fillet operations would present a more difficult problem.

The Alaska processing centers from Kodiak to Dutch Harbor and the communities of the central and southeast districts are in a good position to consider conversion to handling trawl-caught species. With adequate cold storage facilities for stockpiling deliveries of frozen fish, existing plants could schedule groundfish processing to best fit in with their operations for other species. This would be a cost-effective way of utilizing existing facilities and plant areas. During the off-season for shrimp and crab, deliveries of frozen groundfish might be supplemented by deliveries of fresh fish by trawlers making short trips to nearby grounds.

Since 1968 NMFS has been carrying out research in improved methods of utilizing species of fish generally neglected and little used by commercial food fisheries. An NMFS

official noted that while there is an eager market for a number of "luxury" species, there is a limited market for those species which are most abundant.

It appears that the next few years will provide opportunities for using underutilized species of fish for low-cost, high-quality protein extenders for meat in a number of meat products.

For example, tests have been carried out with the muscle of fish commonly taken from the waters of the northeastern Pacific to determine how well they perform as partial replacers of the lean beef used as emulsifiers and nutritional protein sources in sausage products. Commercial food processors found that fish muscle is satisfactory for many products. Work underway suggests that drum-dried fish muscle makes a superior product to soy concentrate used by consumers to extend ground beef. Fish muscle has many uses, most of which have never been investigated.

Marketing potential

Annual per-capita consumption of groundfish products has increased at a much greater rate than consumption for all U.S. fishery products. The underlying cause of this is probably the increase in prices of shellfish, halibut, flounder, and salmon, and the consumer shift to lower-priced groundfish products in retail stores. Increased use of groundfish may also reflect the convenience of breaded sticks and portion products for use by the consumer. Over 97 percent of frozen fish blocks for making sticks and portion products are imported--averaging over 300 million pounds in 1971-74.

In 1974 NMFS contacted a number of seafood purchasing agents, distributors, wholesalers, and brokers in 13 cities to analyze market conditions for a potential groundfish venture in Alaska. NMFS found that there is an interest in Alaska groundfish for future use depending on price, quality, and reliability of supply. Most respondents are looking for new supply sources, new species, better methods of processing, and better business methods. If domestically caught-and-produced Alaska-fishery products were marketed as high-quality items at a fair price, they might account for a large volume of seafood in U.S. markets.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

In 1972 the catch by foreign fishermen off the Pacific coast of the United States and Alaska reached an annual level of over 6.6 billion pounds.

On the Pacific coast, foreign fishing has concentrated on Pacific hake, Pacific Ocean perch, black cod, Alaska pollock, herring, and groundfish of the Bering Sea and Alaska. U.S. fishermen land very little Pacific hake and almost no Alaskan pollock--species that supply about three-fourths of the foreign catch.

Expansion of fishing by Japan and the Soviet Union in waters contiguous to Alaska has brought them in direct competition with U.S. and Canadian fishermen for some species. Since 1960, their fisheries have expanded farther south into the Gulf of Alaska, off the Pacific Northwest, and eventually to northern California. The Republic of Korea joined the groundfish fishery off Alaska in 1967, and by 1975 had spread to the Pacific Northwest. Poland and East Germany also entered the fishery in 1972. The Republic of China entered the fishery in 1976.

This expansion has had a tremendous effect on the fishery resources and has complicated problems of managing and conserving them. Some fish stocks have been overexploited while most others are already fully utilized.

An NMFS planning document listed species they considered to be depleted as of August 1975. The following are the Pacific coast groundfish species other than halibut which were listed

--Alaskan pollock,

--rockfishes,

--yellowfin sole, and

--yellowtail flounder.

Alaskan pollock has been overfished primarily by the Japanese and Soviet fisheries in the Bering Sea. NMFS scientists report substantial depletion of the Alaskan pollock stocks and predict lower catches in the future. Pacific Ocean perch found off the Oregon-Washington coast and in the Gulf

of Alaska have also been badly depleted by Japanese and Soviet vessels. The same is true of the yellowfin sole and other flounders of the Bering Sea.

The Soviet fishery off Washington and Oregon in 1966 for Pacific Ocean perch led to stock depletion on some grounds traditionally fished by U.S. trawlers. Since 1971, the Soviet catch of Pacific hake has been limited by agreement with the United States to 330.7 million pounds per year, the amount believed to be the MSY. Recent commencement of fishing for Pacific hake by other nations--particularly Poland, which reported its catch to be 125.7 million pounds in 1975--has resulted in the foreign harvest exceeding by a substantial amount what the hake resource is believed to be capable of sustaining.

Harvesting capabilities

Although many large and recently built vessels in the Alaska shellfish fleet are suitable for conversion to engage in trawling for groundfish, costs for trawling are higher than for crab fishing. Trawling for groundfish requires greater use of power, and hence more fuel, and causes greater stress on the vessel and equipment than fishing for crab. Vessel owners point out the need for approximately $100,000 additional investment to convert vessels (or construct new vessels) equipped for trawling. This is likely to restrict interest in a seasonal fishery unless market prices paid for groundfish are adequate.

Product development and processing

The fragmented structure of the west coast and Alaska fishing industry into many small and highly competitive units has resulted in reduced profit margins and low capital reserves for speculative ventures in developing new fisheries and fishery products. Commercial fishermen in many established fisheries are now receiving inadequate returns on investment. However, they continue to fish these resources because fishing for underutilized or unutilized species, which would relieve pressure on established fisheries, is too risky due to inadequate knowledge concerning abundance, location of the resources, harvesting methods, and markets for their catch. In addition, the cost for constructing and operating new facilities for processing groundfish species is uncertain.

The finfish species available for development vary not only in size and shape but also in holding quality. Some species cannot be held sufficiently long on ice to allow for a reasonable length fishing trip.

A 1974 cooperative industry-Government Alaska groundfish research program provided a good example of some of the differences in handling and processing finfish compared to shellfish. Pollock, the most abundant species available in all areas fished, was found to have rather poor storage quality regardless of the method of holding. Pollock must be handled very carefully and must be thoroughly chilled rapidly after it is landed. Research is needed to develop simple, effective alternates to icing so that the quality of pollock landed is maintained and the labor required for handling the fish aboard the vessel is minimized.

The plants where fish were landed were designed for processing other fishery products and were not capable of handling groundfish without major facility conversion. Even freezing of whole fish, both individually and in blocks, was difficult. Brine freezing equipment designed for freezing crabs was inadequate for freezing whole fish because of the tendency for fish to pack tightly together, resulting in a thick mass that required several hours to freeze through. The shelf and plate freezers commonly used for halibut, salmon, and crab or shrimp products were not suitable for freezing individual fish or fillets because of the labor involved in loading and unloading.

In summary, several areas have the basic processing plant physical facilities but could not process trawl-caught finfish without major plant conversions. At present, the type of processing best suited to the resources and markets is unknown.

Industry is working with the U.S. Government and foreign governments in order to develop agreements for cooperative fishing ventures whereby U.S. fishermen would catch fish for foreign processing. An industry official told us that Poland wants an agreement from our Government that we will supply certain amounts of fish to them on contract. This is difficult because of the nature of the U.S. fishing industry. For instance, if crab prices go up, our fishermen will move into this fishery. This makes it difficult to reach such agreements without developing some industry/Government agreements.

Work is being carried out by NMFS to improve methods of utilizing species of fish that generally are neglected. Several problems to overcome exist in their work: (1) bottom fish develop rancid flavors during frozen storage, and to a degree dependent on species, off-flavors or fishy flavors can develop, (2) resistance to using fish as a meat replacer or extender exists, and (3) it will be necessary to work with meat processors while they adjust to using fish in their products.

Market development

Many bottom species have the common characteristics of light-colored flesh, low oil content, good texture, and relatively mild flavor. The most acceptable of these are cod, haddock, both the Pacific Ocean perch and Atlantic Ocean perch, and a variety of flounders and soles. Few of the species of bottom fish that are underexploited by U.S. fishermen have the desirable flesh characteristics of these species. Because the American consumer has refused to buy and use more than a few choice species of attractively displayed fish, these fish have not been harvested by our fishermen.

An NMFS analysis of seafood industry representatives contacted in 1974 showed that Alaska-produced pollock would have competitors in the market place. Poultry, hamburger, bologna, vegetable proteins, other low-cost fish such as whiting, Atlantic Ocean perch, and local fresh species--almost any protein food under $1 per pound retail--are major competitors. Most buyers questioned indicated that a reduction in price of seafood items would be needed to lower the difference between seafood and beef and poultry.

Because the United States is so dependent upon foreign seafood imports, potential Alaska groundfish producers, with their relatively small initial production, will be extensively influenced by developments in world markets. The United States probably cannot compete in the pollock block market unless U.S. production costs can be competitive with Japan and other foreign suppliers to U.S. markets. The Republic of Korea, which is developing its North Pacific pollock fishery, is now competing with Japan in the Alaska pollock block industry. The Republic of Korea's pollock block prices in 1974 averaged 10 to 20 cents less per pound than the Japanese product, although the quality reportedly was not always as good.

There is still resistance to pollock product purchases by some large U.S. distributors and retailers. Some carry-out restaurant chains featured cod on their menus in spite of the high product cost. However, some chains may be forced to offer a more competitively priced product to their customers as cod prices rise.

Management controls

Domestic

Although much information on the kinds and quantities of fish and shellfish occurring in the Bering Sea and northeast Pacific is available from research cruises and from records of domestic and foreign fishing operations, large knowledge gaps still exist. This is particularly true of fisheries development which requires answers to specific questions such as anticipated catch rates for individual species or for particular subareas or times of year. To adequately answer these questions will probably require that production fishing trials be carried out from chartered commercial vessels in the areas or times of particular interest.

In many instances, the development of U.S. fisheries is handicapped by depleted resources. Depletion usually has occurred from overfishing by foreign fleets. This situation has been aggravated by the many countries fishing in the Bering Sea and northeast Pacific and by the absence of a suitable management effort to cope with the problem.

Effects of depleting U.S. coastal fish resources are readily apparent, especially when they lead to elimination of fisheries. This has occurred with Pacific Ocean perch off Oregon, which formerly supported a profitable fishery for U.S. trawlers. Most of the reduction in size of the Oregon stocks occurred within the first few years after the initial expansion of Soviet and Japanese trawling to those waters. Both the Soviet Union and Japan subsequently agreed not to conduct purposeful fisheries for Pacific Ocean perch off Oregon and Washington. However, this has not resulted in a resumption of the U.S. fishery because the incidental catches taken by Soviet and Japanese vessels while fishing for other species have been large enough to prevent rebuilding of the Pacific Ocean perch stocks.

Following are examples of complaints expressed by industry representatives concerning U.S. management policies:

--The U.S. Government does not have a strong fisheries policy.

--The Federal Government has not managed the fisheries resource from 3 to 12 miles. The Government should enforce and manage the fisheries resource from 3 to 200 miles. If left to the States to manage, they will favor their own residents.

--Little or no stock assessment work has been done on groundfish because they have not been important in the past, and little funding has been available to do studies.

International

The International North Pacific Fisheries Commission has been helpful in preventing early and drastic depletion of living resources and has contributed to cooperation among the nations in gathering scientific information for stock assessment. However, the controls provided for within the convention have been insufficient to prevent Japan from expanding her groundfish fisheries in the Bering Sea and Gulf of Alaska. Nonmember nations of the Commission (such as the Soviet Union and the Republic of Korea) have also seriously depleted some stocks.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

Fishing by Japan, the Soviet Union, and other foreign nations in the Bering Sea and northeast Pacific has created many problems for U.S. fishermen. The major kinds of problems have been:

--Resource depletion.

--Preemption of fisheries resources and fishing grounds.

--Destruction of, or interference with, fishing gear used by smaller U.S. vessels.

Management actions to rebuild depleted stocks to productive levels are a prerequisite to developing some U.S. fisheries. Extended jurisdiction will provide the legal framework for taking needed management actions.

The advent of extended jurisdiction will for the time provide the impetus to obtain adequate fishery and biological statistics and to implement regulations to rebuild depleted stocks. It also will provide an opportunity to identify areas, species, or stocks of high potential interest to U.S. industry and to prohibit fishing by foreign fleets when such fishing would preclude or greatly impede the development of U.S. fisheries. The tradeoff to foreign governments in such situations could be our permission to fish in areas or for stocks which currently have low development potential for the United States.

APPENDIX III

HALIBUT

Halibuts are the largest of all flatfish and one of the largest species of fish in the world. The average size caught by commercial fishermen is between 30 to 35 pounds, but record size halibut have approached 700 pounds in weight. They are also the flatfish of most value to fishermen. Pacific halibut has been the object of a commercial fishery for about 88 years, but even before that was one of the most important subsistence fish for a number of Pacific coast Indian tribes.

The Pacific halibut is found along the western coast of North America from central California to the Aleutian Islands and the Bering Sea. Halibut season lasts about 4 to 5 months in the main producing areas, which are usually opened in early May. The most productive halibut fishing ground during the period 1968-74 was the section of the Gulf of Alaska from Cape Spencer west down the Aleutian Island chain, producing about 60 percent of the total landings during that period.

The North American catch of Pacific halibut is a regulated fishery managed by the International Pacific Halibut Commission. The Commission was established by a Convention between the United States and Canada in 1923 and was the first international agreement for joint management of a marine fishery..

STATUS OF FISHERY

Current harvest

Since about 1954, the trend in U.S. landings of Pacific halibut has been steadily downward. U.S. landings have declined from a high of about 60.7 million pounds live weight in 1954 to approximately 18.5 million pounds in 1974. Total U.S. and Canadian catch for 1974 was the lowest reported for any year since the turn of the century and was only 39 percent of the 1970 catch.

Consequently, in November 1975 NMFS listed Pacific halibut stock as being depleted in the Northeast Pacific and the Gulf of Alaska. NMFS also determined that halibut stock in the Bering Sea has either been depleted or is in imminent danger of being depleted. Their definition of depleted refers to stocks which have been so reduced through overfishing or man-induced or natural causes that fishing must be greatly reduced so that the depleted stocks can replenish themselves to produce optimum yield. However, the International Pacific Halibut Commission officials have stated that halibut stock in the Bering Sea is also depleted and actually in poorer condition than the stock in the Gulf of Alaska.

While the condition of the Pacific halibut stocks is still critical, the International Pacific Halibut Commission believes long term prospects have improved. During the 1975 season, the catch and the catch per unit of effort increased, the abundance of juveniles in the Bering Sea increased, the incidental catch declined, and the trawl closures for foreign fleets were extended. Far greater improvements are needed before evidence of recovery is certain.

Value of U.S. halibut landings has fluctuated widely. Almost identical U.S. landings of halibut in 1965, 1966, and 1967, of 40.8, 40.6, and 40.1 million pounds, live weight, resulted in values for the total catch of $9.3, $9.8, and $6.5 million, respectively.

The low prices received in 1967 and 1968, which caused many fishermen to drop out of fishing, resulted in a 1968 catch of about 26.0 million pounds live weight, valued at about $4.3 million. The drop in price was due to the marketing as halibut large quantities of imported turbot, a fish similar to halibut. In 1969 Canada and the United States prohibited substitution of this fish for halibut and the price of halibut rebounded. In 1974 a U.S. landing of about 18.4 million pounds live weight was valued at $9.4 million. The U.S. landings of halibut by weight, dollar value, and distance caught from shore for 1972-74 are shown in table 8.

Of the nine Pacific coast fisheries studied, halibut ranked as number seven in weight landed and number six in dollar value in 1974.

Table 8
U.S. Landings of Halibut by Location, Dollar Value, and Live Weight

	1972		1973 (note a)		1974 (note a)	
	Pounds	Value	Pounds	Value	Pounds	Value
	(000 omitted)					
Pacific (Alaska and Hawaii):						
0 to 12 miles	9,144	$ 4,438	8,521	$ 4,400	11,593	$5,812
12 to 200 miles	17,424	8,510	15,463	8,002	6,680	3,393
Beyond 200 miles	45	21	18	9	-	-
Atlantic (except Florida):						
0 to 12 miles	138	121	116	121	111	138
12 to 200 miles	82	63	52	46	34	32
Beyond 200 miles	1		26	23	31	29
Total:						
0 to 12 miles	9,282	4,559	8,637	4,521	11,704	5,950
12 to 200 miles	17,506	8,573	15,515	8,048	6,714	3,425
Beyond 200 miles	46	21	44	32	31	29
Total	26,834	$13,153	24,196	$12,601	18,449	$9,404

a/1973 and 1974 figures are preliminary.

Source: Fishery Statistics of the United States; 1960, 1965, 1970.
Fisheries of the U.S.; 1972-74.

APPENDIX III

Products and processing

The leading U.S. halibut ports on the Pacific coast for 1974 were Kodiak, Petersburg, and Seward, Alaska. During the 1930s, Seattle received 40 percent of the total halibut landings. Since then, the number of vessels in the Seattle fleet has declined, and vessels are selling more of their catch in northern ports. In 1974 Seattle received only 2 percent of the total landings. The pattern of landings changed principally because Alaska firms began paying fishermen prices that competed with the higher prices traditionally offered at Seattle. Most fishermen preferred to deliver halibut to ports near the fishing areas and to make additional fishing trips in the time formerly lost in the long run to Seattle. Table 9 shows the distribution of landings by ports in 1973 and 1974.

Table 9

U.S. Halibut Landings by Port
Dressed Weight (note a)

Port	1973	1974
	(000 omitted)	
Kodiak	4,767	3,201
Petersburg	2,971	3,047
Seward	2,850	1,686
Pelican	657	878
Juneau	937	769
Ketchikan	706	465
Sitka	862	463
Seattle	508	432
Others	3,032	2,997
Total	17,290	13,938

a/ Expressed in pounds.

Halibut is usually frozen because of its high marketability and ease of handling in that form; very little is canned or smoked. Halibut landed at railhead cities can enter the fresh fish market depending on what the market can absorb. However, handling of fresh halibut is more demanding than handling of the frozen products.

Markets

The annual per capita consumption of halibut in the United States reached a peak in 1960 at .227 pounds when the actual retail price was 61.9 cents per pound. By 1970 the retail price had risen to 98.6 cents per pound and annual per capita consumption dropped to .148 pounds. (See tables 10 and 11.) During this time the U.S. landings of halibut fell from 51.2 to 34.5 million pounds, live weight, as foreign trawl fleets increased fishing pressure in the Northeast Pacific.

Between 1960 and 1971, the United States imported between 23.9 and 32.0 million pounds (product weight) of halibut each year. Canada has accounted for the great majority of halibut imported into the United States. In 1971, the latest year figures were available, Canada was the country of origin for 21.5 million pounds of the total 25.7 millions pounds imported. Japan accounted for 3.8 million pounds of the total.

Table 10

Aggregate and Per Capita Halibut Consumption in the United States--1960-70 (Edible weight)

Year	Aggregate (thousand pounds)	Per capita (pounds)
1960	40,857	.227
1961	39,577	.216
1962	38,629	.208
1963	34,962	.185
1964	38,587	.202
1965	34,398	.177
1966	31,762	.162
1967	34,396	.174
1968	35,175	.176
1969	33,067	.164
1970	30,151	.148

Source: Economic Research Laboratory, National Marine Fisheries Service.

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Table 11

Retail Price of Halibut--1960-71
in Cents per Pound

Year	Retail price
1960	61.9
1961	70.9
1962	79.8
1963	68.4
1964	68.0
1965	81.8
1966	86.3
1967	80.1
1968	79.1
1969	99.9
1970	98.6
1971	112.2

Source: Economic Research Laboratory, National Marine Fisheries Service and Bureau of Labor Statistics, Department of Labor.

Fishing fleet

The International Pacific Halibut Commission requires that all vessels over 5 net tons be licensed. The number of U.S. regular halibut vessels (licensed vessels that land at least 10,000 pounds during the season) has decreased from 523 in 1950 to 154 in 1974 (table 12). However, hundreds of small vessels (under 5 net tons) have joined the fleet in recent years. Over 4,000 vessels of all types now land halibut--most in small quantities. We were told that much of the halibut fleet consists of old vessels, many of them built before 1930. Age, however, is misleading; most vessels have undergone extensive rebuilding, are seaworthy, and are usually most efficient. Most of the boats being built today used for halibut fishing are multipurpose vessels with the ability to fish for halibut and other species.

In the Pacific halibut fishery, the International Pacific Halibut Commission prohibits the taking of halibut by nets. This is necessary because the mesh size of nets used in the commercial trawl fishery, while well suited for use on the smaller flounders, cod, and other bottom species, tend to catch an unduly large number of small and young halibut. These young halibut have not reached their optimum or best harvesting size. Therefore, halibut are permitted to be taken commercially only with hook and line gear.

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Table 12

Number of U.S. Regular Vessels in the Pacific Halibut Fishery for Selected Years

Year	Total regular vessels (note a)
1950	523
1955	402
1960	329
1965	209
1970	211
1971	190
1972	217
1973	197
1974	154

a/A regular vessel is a craft with a capacity of 5 net tons or over that has landed at least 10,000 pounds during the season.

Employment

The number of U.S. fishermen employed on regular halibut vessels fell from 1,786 in 1958 to 628 in 1974. However, this does not include the large number of fishermen employed on small boats for which data is not available.

Recreational fishing

Relatively few sportsmen actively seek halibut, and the origin of the halibut sport fishery, and its existence today, was mainly as an incidental catch of sportsmen fishing for salmon.

Those fishing for halibut are mostly seeking food or trophy fish. Alaska has the largest sport fishery directed specifically for halibut.

NMFS conducted a saltwater angling survey in 1970 to estimate the coastwide catch of sportsmen. They estimated the sport catch of Pacific halibut was 202,000 fish and the average weight of each fish was 14 pounds, for a total estimated catch of 2,828,000 pounds. This amount is far greater than that assumed by the International Pacific Halibut Commission or than that indicated by the State agencies. On the basis of estimates from various agencies, the International Pacific Halibut Commission estimated that the number

of fish taken in the sport catch on the entire west coast was:

California and Oregon	1,000
Washington	2,500
British Columbia	5,000
Alaska	10,000
Total	18,500

Because of data limitations, 20,000 fish, or 250,000 pounds, has been proposed as the best estimate of the annual catch in recent years.

Before 1973 all fishing for halibut, including recreational and personal use, was governed by commercial fishing regulations. The International Pacific Halibut Commission was urged by Federal and State agencies to officially recognize the sport fishery as the sport catch increased and enforcement became more difficult. Therefore, in January 1973 the International Pacific Halibut Commission adopted sport regulations which were subsequently approved by the Federal Government. The 1975 regulations, including changes, provided for an open season which began on March 1 and ended on October 31. The daily "bag and possession limit" was two fish. Fishing gear was limited to hand-held rod or line and spear.

Effect on regional economy

Although we could find no specific information on the economic effect of the halibut fishery, the following facts indicate its regional importance.

--The vast majority of all halibut caught by U.S. fishermen in 1974 was landed at Alaskan ports. Landings at these ports accounted for all but 1.2 million pounds of the 13.9 million pounds (eviscerated, decapitated weight) of Pacific halibut.

--Value of the 1974 U.S. halibut catch was $9.4 million.

--In 1974 the U.S. fishery had 154 regular halibut vessels which employed about 628 men. Many more small vessels have joined the fishery in recent years.

In addition to the direct economic effect caused by landing of halibut at Alaskan ports, the secondary effect of wholesalers, retailers, and shipbuilding and overhaul facilities in other west coast cities must be considered.

Management Controls

The International Pacific Halibut Commission's sole function of Pacific halibut is to maximize management yield for the benefit of Canada and the United States. The Commission has promulgated conservation measures, such as establishing catch limits, season length, and minimum size of harvestable halibut to rebuild and maintain the halibut stock at a level of maximum yield.

The cost of operating the International Pacific Halibut Commission is shared equally by the Governments of Canada and the United States. The United States appropriates funds for the Commission through the Department of State, while Canada's Department of Environment funds their share of operational costs.

In 1951 the Tripartite Convention for the High Seas Fisheries of the North Pacific Ocean established the International North Pacific Fisheries Commission of Canada, Japan, and the United States. This Convention was to "* * * ensure the maximum sustained productivity of the fishery resources of the North Pacific."

Included in the annex of the Convention are conditions of abstention for certain stocks of halibut already being exploited. The halibut originating along the North American coast qualified for abstention by Japan and remained under the jurisdiction of the Canadian and United States Commission. Halibut caught west of 175° W. longitude, however, were not considered to be of North American origin and did not qualify for abstention. In 1962 the International North Pacific Fisheries Commission decided that the halibut caught in the Bering Sea east of 175° W. longitude no longer qualified for abstention, thereby placing management responsibility with their own Commission. Consequently, the condition of halibut stocks in the eastern Bering Sea is reviewed annually by two international fisheries bodies.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Halibut stocks in the Northeast Pacific, the Gulf of Alaska, and the Bering Sea are in such serious condition that a reduction in the incidental halibut catch would be required to improve stock abundance.

APPENDIX III

Harvesting capability

Officials from the International Pacific Halibut Commission told us many skilled halibut fishermen and boats participate in the fishery; only the condition of the fish stock limits the fishery.

Product development and processing

Most of the Pacific halibut landed by U.S. fishing boats enters the market as fresh or frozen halibut products; little is canned or further processed. An International Pacific Halibut Commission official told us that because the price and demand for halibut in these primary forms is so high, little need exists to develop new products.

Marketing potential

The official further said that the domestic market for halibut can easily absorb the U.S. harvest and halibut imports. If additional halibut resources were available, they also could be easily marketed.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Industry, Government, and International Pacific Halibut Commission officials attribute the decline in U.S. halibut landings to several causes. They cite Japanese and Soviet trawlers as having the most serious effect on halibut stock. Halibut are caught incidentally to the trawling for target species, such as black cod, pollock, and ocean perch. Overfishing, another cause of halibut depletion, will be discussed under the section on management controls.

The total estimated foreign catch of halibut for the period 1958-72 is shown in table 13. In the 10-year period 1962-71, the foreign catch averaged 25.5 percent of total landings for Pacific halibut. However, the foreign catch includes young halibut below the legal size for U.S. and Canadian setline fishermen. Loss of these young fish is reducing recruitment of halibut into the setline fishery stocks.

Harvesting capabilities

Officials of the International Pacific Halibut Commission and Seattle Fishing Vessel Owners Association told us harvesting capabilities in the form of vessels and manpower

Table 13

Percent of Total Halibut Catch by Japanese and Soviet Fleets 1958-72 (Round or live weight)

Year	Estimated Japanese catch	Estimated Soviet catch	Total estimated Japanese and Soviet catch	North American catch (United States and Canada)	Total catch of Pacific halibut	Percent landed by Japanese and Soviets
	(millions of pounds)					
1958	3.2	N/A	3.2	86.7	89.9	3.6
1959	6.1	0.8	6.9	95.3	102.2	6.8
1960	18.7	1.3	20.0	95.7	115.7	17.3
1961	29.6	2.0	31.6	92.6	124.2	25.4
1962	24.9	4.7	29.6	100.0	129.6	22.8
1963	19.1	7.8	26.9	95.0	121.9	22.1
1964	6.5	6.2	12.7	79.8	92.5	13.7
1965	5.4	19.8	25.2	84.4	109.6	23.0
1966	9.7	13.1	22.8	83.0	105.8	21.6
1967	18.7	8.3	27.0	73.8	100.8	26.8
1968	16.7	6.0	22.7	64.9	87.6	25.9
1969	16.8	4.6	21.4	78.0	99.4	21.5
1970	21.1	6.0	27.1	73.1	100.2	27.0
1971	22.5	7.4	29.9	62.0	91.9	32.5
1972	18.5	10.2	28.7	57.2	85.9	33.4
1973	14.9	7.7	22.6	42.2	64.8	34.9

Source: International Pacific Halibut Commission.

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are available to move into the fishery when the stock recovers.

Product development and processing

Product development and processing are not obstacles to revitalizing this fishery. Demand for halibut is already high. Abundant processors and cold storage facilities are located in all the major ports where halibut is landed.

Market development

The market for halibut exists and is large; however, depletion of the stock has limited the amount of halibut available.

Management controls

The effect of foreign trawlers on the halibut stock has required the Commission to adopt more stringent conservation measures. However, only the United States and Canada conform their halibut fishing to Commission regulations. Japanese and Soviet trawlers have harvested the halibut contrary to conservation measures adopted by the International Pacific Halibut Commission except for the Commission's size limits which were adopted by the Japanese.

The United States and Canada have attempted to limit the catch of halibut by Japanese trawlers on recommendations of the International Pacific Halibut Commission through agreements by International North Pacific Fisheries Commission member nations. The Japanese enforcement of International North Pacific Fisheries Commission regulations has been inadequate and some of their vessels have violated the agreements reached through this Commission. The Soviet Union is not a member of this Commission and can legally fish anywhere in waters outside the U.S. 12-mile limit and can keep any fish they catch. Thus, past actions by the International Pacific Halibut Commission to conserve the halibut stock were offset by the effect of foreign trawlers.

In 1973 the International Pacific Halibut Commission proposed that foreign trawling be prohibited in particular areas of the Bering Sea where the incidence of halibut was high, but trawl effort was low. Other areas would remain open to trawling yearround and the closed areas would be open to fishing during those times when the incidental catch of halibut was low. The Japanese agreed to most of the closures through negotiations with the U.S. and Canadian Governments. In 1974 the Japanese, in response to a second

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proposal by the International Pacific Halibut Commission, agreed to expand closures in the Bering Sea for 1975 and additionally agreed to several closed areas in the Gulf of Alaska. Canada and the United States discussed these closures with the Soviet Union and similar agreements were reached for 1976.

The International Pacific Halibut Commission accepts some responsibility for decline of the halibut stock. The Commission allowed the catch to exceed the maximum sustained yield to demonstrate that the stocks were fully utilized, a requisite for Japanese abstention under the International North Pacific Fisheries Commission. Stocks continued to decline even after the International Pacific Halibut Commission reduced the catch limits of the setline fishery. Reductions in the setline catch were not sufficient to compensate for the increased landings which resulted from the combined effort of the setline fishery and the increased incidental catch of halibut taken by the United States, Canada, Japan, and the Soviet Union. The magnitude of the incidental catch of halibut was unknown until the early 1970s. Studies have since shown that the incidental catch of halibut increased sharply during the 1960s and early 1970s and in some areas exceeded the catch by the U.S. and Canadian setline fishery. The incidental catch effectively weakened the Commission's management control and was a major reason why stocks have not responded to conservation measures.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

We believe the major reason for the decline in halibut abundance is the incidental catch of halibut by the large foreign trawl fishery off the British Columbia and Alaska coasts.

The Japanese trawl fishery in the northeast Pacific is primarily directed at Pacific Ocean perch. Walleye pollock and yellowfin sole are the primary target fish in the Bering Sea.

Halibut is also caught by U.S. trawl fishermen but by law all halibut caught by this method must be released.

Many ships from Japan, the Soviet Union, and South Korea annually fish in international waters off Alaska. These foreign fleets are capable of depleting the resources supporting Alaska's largely inshore commercial and marine sport fisheries. The United States Government has long recognized this threat and increasingly has used international agreements to protect vital U.S. fisheries. Only in the

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last 3 years have U.S. bilateral agreements with Japan and the Soviet Union had a primary regard for halibut.

Halibut fishing interests favor U.S. implementation of a 200-mile fishing zone. The International Pacific Halibut Commission anticipates greater control over foreign fleets when extended jurisdiction is established.

HERRING

A herring fishery exists on both the Atlantic and Pacific coasts of the United States. The Atlantic herring, also known as Atlantic sea herring, is one of several related species of fish which are members of the herring family. Along the U.S. Atlantic coast, other herring-related fisheries exist for Atlantic menhaden and river herring (alewife and blueback herring).

The Pacific herring is very similar to the Atlantic herring; both are considered to be only subspecies of the same species. They differ primarily in spawning habits, growth, and longevity. Herring are fast swimmers and occur in large schools which may exceed 1 million fish. They feed principally on planktonic crustaceans, store large quantities of oil in their bodies, and can be used to produce a large variety of products.

Altantic herring are found from Newfoundland, Canada, to Cape Hatteras, North Carolina, but only small amounts of Atlantic herring are now caught south of Long Island, New York. Most of the Atlantic herring are landed in Maine and Massachusetts. There are fisheries for herring juveniles (under 4 years old) and adults. The U.S. fishermen concentrate on juvenile herring which are packed as sardines. However, interest in adult Atlantic herring is growing due to increased demand for its use as an edible food product; previously it had been used primarily in fishmeal production.

Pacific herring can be found throughout the coastal domain, from northern Baja, California, on the North American coast, around the rim of the North Pacific Basin to Korea on the Asian coast. There are no indications that herring occur beyond the edge of the continental shelves in mid-Pacific waters. Most Pacific herring landed on the west coast are landed at Alaskan ports.

STATUS OF FISHERY

Current harvest

The total 1975 U.S. landings of sea herring were 120 million pounds, valued at $5.6 million. The Atlantic herring landings were 80 million pounds, valued at $2.7 million. The Pacific herring catch of 40 million pounds was worth $2.9 million. Another product of the fishery that comes exclusively from Alaskan waters is kelp with herring eggs. In 1973 the west coast accounted for 306,000 pounds, valued at $153,000.

In 1973[1] the Atlantic herring fishery ranked fifth in volume and 19th in value (using exvessel price) among Atlantic coast fisheries. Pacific herring ranked sixth in pounds caught and eighth in dollar value in 1973 among west coast fisheries.

1972 Atlantic Coast Herring Landings by State

State	Pounds	Value
	(millions)	
Maine	44.7	$1.42
Masschusetts	37.8	.75
Rhode Island	5.1	.11
Other States in New England, Middle Atlantic, and Chesapeake Bay combined	.9	.03
Additional updated landings not available by individual State	1.8	(a)
Total	90.3	$2.31

[a]Value was not available.

1972 Pacific Coast Herring Landings by State

State	Pounds	Value
	(millions)	
Alaska	34.87	$2.66
Washington	6.90	1.24
California	2.82	.11
Oregon	.04	.003
Total	44.63	$4.013

[1]1973 is the latest year for which data on all the fisheries was available; later data was not available for the Atlantic herring fishery.

Products and processing

Unlike most other species, the herring can be used to produce a wide variety of products. NMFS lists several uses that are made of herring in this country. For example, herring are used for bait and are filleted, canned as Maine sardines, made into spreads, salted, and smoked. Herring are also used in the production of meal, oil, and pearl essence. Exported herring products include herring roe, and eggs on kelp.

1972 Processed Value of Herring Products (note a)

Product type	Volume (pounds)	Value
	(millions)	
Canned sardines	(1.56 million cases)	$23.9
Fish and spreads	(.02 million cases)	.4
Salted:		
Cured and refrigerated	12.26	8.5
Fish	8.44	5.1
Roe	.26	.5
Eggs on kelp	.62	.9
Smoked	.45	.2
Meal and scrap	10.97	1.2
Oil	5.06	.5
Pearl essence	(b)	1.1
Bait	5.38	.4
Total		c/ $42.4

[a]Table does not include some products, such as fillets, which were not classified separately.
[b]Not available.
[c]Individual product totals do not add due to rounding.

Atlantic herring are processed at plants principally in Maine where juvenile herring are canned as sardines. Processing sardines is a relatively labor-intensive canning operation. The number of plants operating in Maine has declined from 23 in 1966 to 15 in 1976, due to strong foreign competition and reduced availability of juvenile herring, according to industry officials.

Adult herring are processed into a variety of products including whole, headed and gutted, and filleted herring. Most of the adult herring products are exported to Europe. Until recently, most adult herring landed were used to make fishmeal, but the majority is now used for food production.

The greatest tonnage of the Pacific herring catch is sold either as whole frozen fish or as frozen bait. Herring roe, eggs on kelp, and meal are also processed. In 1974 the Alaska Department of Fish and Game reported there were 29 plants in Alaska involved in the processing of fresh and frozen herring products. Twenty-five of those plants were in the southeastern part of the State and on the Gulf of Alaska. Fourteen plants processed herring roe and herring eggs on kelp. Only two plants processed herring meal.

Markets

Domestic sardine consumption fluctuated between 0.3 and 0.5 pounds for each person from 1960 to 1974 but declined to 0.2 pounds in 1975. The decline was due to consumer resistance to higher prices. In 1960 imports accounted for about one-quarter of domestic supplies and by 1974 imports had increased to about three-quarters. In 1975 the import share dropped to about one-half of domestic supplies. Price increases caused by high foreign inflation rates, currency adjustments which favored U.S. products, and depletion of European herring stocks were major factors contributing to the decline in imports, according to an industry official.

Domestic consumption of other herring food products is small and is limited primarily to smoked or marinated herring. Some adult herring products have been exported in recent years in response to a strong European demand, combined with the depletion of European herring stocks.

The commercial fishery for herring in Alaska began in the late 1800s and since then has supported four distinct types of industry: (1) manufacturing of fishmeal and oil, (2) salting and pickling of fish, (3) preparing of the whole fish for bait, and (4) processing of the eggs on kelp and roe. The bait, and eggs on kelp, and roe industries are now the most active in the State.

A 1972 NMFS report indicated that the commercial bait fishery in Alaska had remained stable at about 4.6 million

pounds annually for the previous 10 years. However, Alaska Department of Fish and Game statistics show an increase to almost 11 million pounds in 1973.

Fishing fleet

The U.S. fleet does not now have the capability to fully harvest the Atlantic herring resources within 200 miles of the U.S. coast. The fleet is unable to harvest offshore stocks, partly because herring deteriorate quickly and partly because U.S. vessels are not capable of making extended trips to some offshore herring grounds.

The Atlantic coast herring fleet primarily seeking juvenile herring consisted of about 215 boats and 21 vessels in 1972. Many of these craft spend only part of the year fishing for herring. Most of the vessels are old and inefficient, compared to the relatively modern Canadian vessels. according to NMFS and industry officials.

Adult herring are caught in large quantities by otter trawls and purse seines, but recently midwater pair trawling, a European method using two boats to pull one net, has been introduced. Juvenile herring are caught primarily by stop seines.

1972 U.S. Landings of Atlantic Herring by Gear Type

Type of gear	Pounds
Stop seines	33,600,000
Purse seines	24,900,000
Otter trawls	24,100,000
Weirs	3,500,000
Midwater trawl	2,200,000
Pound nets	1,300,000
Other	700,000
Total	90,300,000

On the Pacific coast, herring are taken by purse seines, various types of gillnets, haul seines, fish pound nets, dip nets, lampara nets, and trammel nets. Herring eggs on kelp

are taken by hand picking and by diving. The Alaska Department of Fish and Game reported that 28 seine vessels, 2 gillnetters, and 1 herring pound netter participated in Alaskan herring fishery during 1973 and 1974 compared with 10 seine vessels and 2 pound netters during 1970 and 1971 and 22 seiners and 2 pound netters during 1972 and 1973. The increase in fishing gear during 1973 and 1974 was attributed to the high prices paid for herring roe. Alaskan herring eggs on kelp were all hand picked.

Employment

There were 392 fishermen engaged in the Atlantic coast herring fishery in 1972. Most fishermen were located in Maine and fished only for part of the year. Processing and wholesaling establishments in Maine employed about 1,300 people in 1972.

In 1972 NMFS listed 211 Pacific coast vessel fishermen involved in purse or haul seining for herring, and 195 additional fishermen were similarly employed fishing from boats or from shore. Of the total 406 fishermen using this particular gear, 381 were from Alaska. We could not determine the number of fishermen who participated in the fishery using other gear types because similar statistics were not available.

Recreational fishing

There is no recreational fishing for Atlantic herring, but herring are part of the diet of popular recreational fish, such as bluefish and striped bass. Pacific herring does not support a sport fishery either; however, they are actively pursued by sport fishermen for use as fresh bait. For instance, in Alaska the presence of herring jigs on sportfishing vessels is almost universal, and the use of gillnets for bait catching is quite common.

Management controls

Regulation of Atlantic herring stocks is split. Inside the 3-mile territorial limit, the fishery is regulated by the States. Beyond this zone, NMFS, in cooperation with the Coast Guard, enforces regulations adopted by the International Commission for Northwest Atlantic Fisheries (ICNAF). NMFS and the Coast Guard monitor fishing activity off U.S. coasts through aerial surveillance and vessel boardings. ICNAF establishes annual quotas on the amount of herring that can be harvested by member nations.

The States have not set annual quotas on the herring catch. However, Maine has established regulations which prohibit catching less than 4-1/2-inch-long herring, except for bait, and which requires 4-1/2- to 9-inch-long herring to be used for food or bait. There are no specific herring regulations in Massachusetts, but the State prohibits otter trawling and purse seining in some areas.

Nearly all the Pacific herring is caught within 3 miles of the U.S. coastline. Therefore the individual west coast State governments have management responsibility for this resource. The herring fishery on the west coast has been a regulated fishery. Regulations specify the type of gear used, length and size of mesh of the fishing gear, closed seasons, protected areas, and quotas.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Herring resources within 200 miles of the U.S coast in the Atlantic, while seriously depleted, are large enough to allow increased use by U.S. fishermen. The estimated MSY is about 300 to 500 million pounds. Catch statistics for 1975 show that U.S. fishermen caught about 80 million pounds, or only 22 percent of the total catch of about 360 million pounds. If herring resources recover to levels of about the MSY, U.S. fishermen would have available an additional 220 to 420 million pounds over the 1975 level.

A 1972 NMFS report stated that the catch of Gulf of Alaska herring was considerably less than the estimated maximum sustained yield of 500 million pounds. The total Alaskan herring catch for 1973 was 34.9 million pounds, indicating a very large underutilized stock.

Major spawning areas for California herring are San Francisco and Tomales Bays. However, a 1973 NMFS report stated that the San Francisco Bay population had been estimated only once, in 1955, at 24 million pounds. The Tomales Bay population was estimated in 1972 by State biologists at about 8 million pounds. The total 1973 California herring catch was only 2.8 million pounds.

Harvesting capability

Technology is available to improve the harvesting capabilities of U.S. vessels in the Atlantic. NMFS and industry officials described Canadian purse seiners as being much more efficient than U.S. vessels. According to these officials,

subsidized Canadian vessels are newer and carry more sophisticated detection equipment than U.S. vessels. Better equipment enabled Canadian fishermen to locate and catch herring in the Gulf of Maine when U.S. vessels could not.

To minimize herring spoilage, a NMFS-sponsored development program arranged a test of a new method for holding herring at sea. A carrier vessel used to transport herring from the catching vessel to the processing plant was partly converted to a chilled sea-water storage system. Tests showed that herring could be held aboard ship long enough to enable U.S. fisherman to land herring from offshore areas in good quality. This system, or an adaptation, may also be useful in improving the quality of herring landed from inshore areas.

No increase in harvesting capabilities is required to harvest Pacific herring which inhabit the protected sounds and inlets in southeastern and central Alaska. However, to take advantage of the resource located in other waters, such as the Bering Sea and Gulf of Alaska, might require larger vessels and different types of fishing gear than are presently used in the small inshore fishery.

Product development and processing

On the Atlantic coast, increased herring abundance will enable more efficient use of existing processing facilities. In addition, NMFS is analyzing the feasibility of U.S. production of semiprocessed, marinated herring products currently imported. Although exact figures were not available on the extent of these imports, one NMFS official estimated that from 20 to 50 million pounds were imported annually.

Alaska could use herring as a source for fish protein concentrate when a more economical technique is found to produce foodstuffs from fatty fish. Using herring for fish protein concentrate would help the Alaska fishery have a bigger share of the world market.

Marketing potential

Foreign markets provide an opportunity for expanding the U.S. herring industry. Consumption of herring products in West Germany, according to an industry official, is estimated to be between 200 to 300 million pounds a year. The United States supplies only a small portion of the European market.

U.S. processors may be able to supply a larger share of the domestic sardine market at the expense of imports. The U.S. industry is now better able to compete against imports,

according to an industry official, because the cost of imported sardines has increased more than the cost of domestically produced sardines. Higher foreign inflation rates, currency adjustment which favored U.S. products, and depletion of European herring stocks were cited as major reasons for the relatively higher cost of imported sardines.

Increased abundance of juvenile herring off the U.S. coast is needed for the United States to take full advantage of this opportunity. With increased abundance, imports of unprocessed Canadian-caught herring could also be reduced. Over one-half of the 1975 U.S.-packed sardines, according to an industry official, was processed from juvenile herring imported from Canada.

The catching of adult herring by U.S. fishermen and the transfer of the catch directly to foreign vessels is also a possibility. A European industry official has had preliminary discussions with U.S. fishermen on this subject.

In Alaska the fishmeal and oil markets provide an opportunity for expanding the Alaskan herring industry. A 1972 NMFS report pointed out that Alaska's herring processing plants were standing idle, although the resource was as healthy as ever. For example, in 1937, 249 million pounds of Alaska herring were used to produce fishmeal and oil, but the report said this industry failed due to increased foreign competition, high labor costs, and restrictive fishery regulation by Alaska.

Another potential opportunity for the herring fishery in Alaska is the growth of the export market for herring roe and eggs on kelp. Between 1973 and 1974 the tonnage of these two herring products greatly increased.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Atlantic herring stock size and the resultant catches have shown wide natural fluctuations. Atlantic herring stocks off the U.S. coast are seriously depleted. Large increases in fishing effort helped maintain high catches despite a drastic decline in stock abundance.

NMFS reported that, for Alaskan herring stocks, a relationship between the number of herring eggs produced and the resulting adult herring has not been established. Limited spawnings have occasionally produced a large number of fish, and heavy spawnings have sometimes resulted in small numbers.

Therefore, removing large quantities of eggs for the specialty fisheries of eggs on kelp and egg roe has an unknown effect on the herring population. Considerable research is needed to determine the relationships between eggs produced and resulting herring because of the increasing demand to harvest the eggs. Alaska makes studies of the herring fishery using hydroacoustical gear to locate and obtain estimates of the number of fish congregating in large wintering schools. Alaska also makes annual sampling of known stocks for determining age, sex, and size composition of fish within each stock. This information is needed for management decisionmaking. However, an NMFS official told us the actual size of Alaska's herring stock was much larger than indicated by the assessment. He believed the assessment program was insufficient because of a lack of funding by the State legislature. He believed the low-stock assessment and the political pressure generated by salmon fishermen wanting herring preserved as forage for salmon have been the major factors in limiting Alaska's herring fishery. Many fishermen think adequate stocks of herring are necessary to sustain important food fishes, such as coho and chinook salmon. However, some biological evidence suggests that these carnivorous fish may feed equally well on other organisms, especially if herring abundance is low.

Harvesting capability

Due to their age and condition, the vessels now in the Atlantic herring fishery may not be able to survive storms in offshore areas where large increases in adult herring catch would have to be obtained. Other problems cited by NMFS and industry members were the reluctance of U.S. fishermen to be at sea for 1 or 2 weeks which are required to harvest offshore herring and the risk of losing expensive gear on unfamiliar grounds. Also industry members may hesitate to make needed investments to greatly increase domestic landings because of uncertainties related to the future availability of the resource and the stability of the foreign herring market.

Sophisticated foreign-built detection equipment is available but is subject to tariffs, which increases the cost to U.S. fishermen. A NMFS official stated that midwater pair-trawling nets are subject to tariffs, even though they are not manufactured in the United States. Also U.S. fishermen must compete with fishermen of foreign nations, which subsidizes the construction of fishing vessels.

In Alaska too much vessel capacity exists in one part of the herring fishery, due to the low quotas of herring allowed by the State. For example, an NMFS official told us there were 42 large purse seiners and 15 tenders, worth about $20 million, participating in the 1975-76 herring roe fishery.

He said one net set could yield $20,000 to $30,000 worth of fish, or one-third of an area's quota. This get-rich-quick opportunity lures too many fishermen into an already crowded fishery. But, he said the number of vessels and fishermen in Alaska's relatively static herring bait fishery is sufficient.

Product development and processing

Reduced abundance of Atlantic herring stocks available to U.S. fishermen has lessened industry willingness to make additional investments in processing facilities. Recovery of the stocks through better management should alleviate this problem. Low-fat content of adult herring at certain times during the year is also a problem. Fat content is one determinant of herring product quality. Herring with lower fat content than desired by European imports receives a substantially lower price.

The southeastern Alaskan herring reduction fishery has been inactive since 1966. A disadvantage of the more recent and active herring roe fishery is that this valuable fishery operates on a later stage in the live history of the herring than a reduction fishery. Natural mortality will have taken an additional toll at this stage, and the total tonnage available will be less than for a reduction fishery. Moreover, some of the stocks fished by a reduction fishery are not suitable for a roe fishery. Consequently, the sustainable yield for a roe fishery is somewhat lower.

Market development

Developing domestic markets for adult herring products will take a long time, according to NMFS and industry officials, because consumers are reluctant to eat fish with dark meat and bones, such as herring. Large increases in domestic landings appear dependent on satisfying international markets. The potential for expanding U.S. exports of herring might be adversely affected by herring stock recovery off European coasts or by increased use of European-caught herring for food production.

Management controls

Fragmented jurisdiction and inadequate knowledge about herring stock separation and migration among the Gulf of Maine, Georges Bank, and Nova Scotia stocks are problems affecting fishery management. NMFS biologists believe that there is some intermixture among these stocks but that its extent is not fully known. A herring tagging study involving NMFS and the States is being considered as a means of providing additional data. Current ICNAF catch quotas are set for each

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stock and are designed to prevent further population decline in these seriously depleted fisheries. The potential for stock recovery would be improved, according to a NMFS official, with further quota reductions in each stock. Stock recovery also depends on favorable environmental conditions.

The Gulf of Maine herring stock is now fished primarily by U.S. vessels. ICNAF quotas in this area are not fully effective because they do not apply inside the 3-mile territorial limit controlled by individual States. To prevent further decline in the Gulf of Maine, a 35.3 million pound quota for the adult herring fishery was adopted for 1975. U.S. fishermen were allocated 23.7 million pounds, but they caught about 37.2 million pounds. About 8.9 million pounds were reported as having been caught within the 3-mile limit where there are no quotas. Assessment studies indicated that the 1976 quota was further reduced to 15.4 million pounds, of which the U.S. share was 13.2 million pounds. As of June 15, 1976, U.S. fishermen had already caught 22 million pounds in total, combining landings within and beyond the 3-mile limit. ICNAF officials are considering a zero Gulf of Maine herring quota for 1977, to prevent further stock declines.

Industry officials disagree with the existing quota system on individual stocks. They believe that there is considerable intermixing among stocks, and therefore any quota reductions should first be applied to foreign quotas. A State official also believes that quota reductions should first be applied to foreign quotas. He added that the State is not willing to impose quotas in its territorial waters unless it can be shown that the catch inside State waters is responsible for the Gulf of Maine stock decline. This official believes that foreign fleets which have caught most of the herring off the U.S. coast may have caused the resource decline.

A 1970 publication by an official of the Bureau of Commercial Fisheries (currently the National Marine Fisheries Service) noted that throughout the history of the Alaskan herring fishery, restrictions had been more limiting than those of almost any other North American herring fishery. Alaska laws have, at one time or another, governed the length and depth of nets and mesh size; they have also provided either total or partial exclusion of seines as well as restrictions on use of the catch (i.e., bait or reduction). Traps or other obstructions that prevented the free passage of fish were prohibited. Closed seasons, closed areas, and quotas have been in effect to limit herring catches, and all areas closed to salmon fishing were closed to herring fishing.

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EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

In the Atlantic, more effective management is needed to insure improved resource availability to U.S. fishermen. The Fishery Conservation and Management Act of 1976 provides an opportunity for improved herring management by extending U.S. jurisdiction over fishery resources to 200 miles off U.S. coasts and by creating the Regional Fishery Management Councils. There is, however, still a potential jurisdiction problem related to controlling the northeast portion of Georges Bank, a highly productive fishing ground off the New England coast but partially within 200 miles of the Canadian coast. Establishing boundaries based on equidistant lines between the Canadian and U.S. coasts would result in Canada's controlling the northeast portion of Georges Bank. U.S. officials contend that Georges Bank is an extension of the U.S. Continental Shelf and therefore should be under U.S. control. The disputed area is a major herring spawning ground. Joint United States-Canadian management will be needed for effectively managing the resource because some herring migrate between Nova Scotia, Canada, and Georges Bank.

A potential allocation problem also exists because juvenile herring used for sardines have had a higher value but a much lower weight yield per fish caught than adult herring. Once used only for low-value industrial uses, adult herring are now being used for food products at higher prices.

The Pacific coast herring fishery is conducted primarily within 3 miles of the U.S. coast and therefore would not be affected by the 200-mile limit.

AMERICAN AND SPINY LOBSTERS

Domestic fishermen harvest two types of lobster, the American lobster and the spiny lobster. The American lobster is found from Labrador, Canada, to North Carolina. The inshore area (within 12 miles of the coast) from Maine to Cape Cod Bay, Massachusetts, has historically produced the majority of American lobster landings. This 10-legged crustacean is located in waters ranging from a few feet to over 1,000 feet deep. The greatest numbers are caught in rocky inshore waters. In recent decades many lobsters have been caught in offshore areas along the continental shelf, which slopes up to 100 miles from shore.

After shedding their shells (molting), American lobsters are especially vulnerable to predators, including other lobsters. In Maine, the leading lobster producing State, lobsters reach harvestable size in about 4 to 7 years. The 1973 landings of 29 million pounds, worth $41.6 million, using ex-vessel prices, ranked this fishery tenth in volume and first in value among Atlantic coast fisheries. A major problem in this fishery, is the depletion of the inshore resource occurring because inadequate management controls have led to overfishing of available stocks.

The spiny lobster is found in U.S. waters along the east coast of Florida from Cape Canaveral to the Dry Tortugas. The primary concentration is in the southern part of the State, mostly on the east coast of the mainland and in the Florida Keys.

The spiny lobster resembles the American lobster in general appearance but lacks the large claws. Some of its distinguishing characteristics are numerous spines covering the body, two especially large spines or horns projecting over the eyes, and legs longer than those of the American lobster. Over 4 years are required for spiny lobsters to grow to a minimum legal harvesting size. In general, adult lobster movements are described as random wanderings, usually over short distances of 5 miles or less; but longer wanderings do occur on occasion.

The U.S. landings of spiny lobsters in 1972 were 12.2 million pounds, worth $12.8 million, which ranked the spiny lobster eighth in volume and third in value among fisheries in the Gulf States. The U.S. spiny lobster fishery is concentrated primarily in the State of Florida which in 1972

accounted for 93 percent of the total landings and 92 percent of the total value. The remaining landings were of a related species in California except for small landings in South Carolina, Alabama, and Mississippi. A large portion of the lobsters landed in Florida have been caught in Continental Shelf waters off the Bahama Islands. Idle capacity, a major problem in this fishery, resulted when Bahama declared the spiny lobster a creature of their Continental Shelf and began enforcing a ban on foreign fishing on the shelf as of August 1, 1975.

STATUS OF FISHERY

Current harvest

Landings of American lobsters in 1975 were 29 million pounds valued at $49.1 million. Inshore landings have generally declined since 1960, while offshore landings peaked in 1970. (See tables 1 and 2.) NMFS officials stated that the offshore landings data may not be accurate due to the large number of lobster landing sites which causes difficult data collection and incomplete reporting by lobster fishermen.

TABLE 1
American Lobster Landings 1960 to 1975

Year	Pounds			Total Value (Exvessel)
	Inshore landings 0 to 12 Miles (note a)	Offshore landings 12 to 200 Miles	Total Landings	
	(millions)			
1960	29.3	1.8	31.1	$14.3
1961	25.7	2.3	28.0	14.6
1962	26.8	2.7	29.5	15.0
1963	27.3	3.0	30.3	16.8
1964	26.9	4.1	31.0	19.9
1965	24.5	5.7	30.2	22.0
1966	25.6	3.9	29.5	22.3
1967	22.2	4.3	26.5	22.4
1968	27.5	4.9	32.4	25.5
1969	26.8	7.0	33.8	29.0
1970	25.1	8.4	33.5	33.5
1971	24.9	8.4	33.3	35.1
1972	21.6	7.7	29.3	36.1
1973 (note b)	23.9	5.1	29.0	41.6
1974 (note b)	22.4	5.8	28.3	42.4
1975 (note b)	23.2	5.8	29.0	49.1

a) Most American lobsters are caught within 3 miles of the coast. For 1973, 1974, and 1975 the percentage of total lobsters caught inside this zone was 79.7 percent, 72.5 percent, and 74.2 percent respectively.

b) Preliminary data.

TABLE 2
1975 American Lobster
Landings by State (note a)

State	Pounds	Value	Percent pounds
	(000 omitted)		
Maine	17,018	$27,479	58.6
New Hampshire	510	918	1.8
Massachusetts	5,522	9,742	19.0
Rhode Island	3,643	6,545	12.6
Connecticut	647	1,132	2.2
New York	669	1,400	2.3
New Jersey	850	1,555	2.9
Delaware	27	48	.1
Maryland	59	106	.2
Virginia	91	165	.3
North Carolina	-	-	-
Total	29,036	$49,090	100

a/ Preliminary data

Table 3 shows a 10-year history of the U.S. and Florida spiny lobster landings including Florida catch from domestic and foreign waters. The Florida spiny lobster catches grew steadily to a peak of 11.4 million pounds in 1972 and then declined in succeeding years due to increasing harvesting restrictions by the Bahamian Government. The overall trend for catches in Florida waters has been gradually upward. (See table 4). Preliminary statistics for 1975 show a decline in landings from Florida waters. The major portion of the decline is attributed to unilateral actions by the Bahamian Government prohibiting a U.S. spiny lobster harvest in the continental shelf waters of Bahama.

On August 1, 1975, U.S. fishermen were displaced from fishing the continental shelf waters of Bahama. Bahama declared the spiny lobster a creature of their continental shelf making it unlawful for other nations to fish them. Negotiations with the Bahamian Government have proved fruitless, and as a result about 800 fishermen in the Florida area are unemployed. About 50 vessels are now working the shelf areas off Guatemala, Honduras, and Nicaragua. How long this will be permitted by these countries is not known.

TABLE 3

Spiny Lobster Landings in U.S., Florida, and from Foreign Waters Off Florida

Year	Total U.S. landings		Total Florida landings					
						Pounds		
	Pounds	Value	Pounds	Value	Percent of U.S. (pounds)	From domestic waters (note a)	From foreign waters	Percent From foreign waters
	(millions)					(millions)		
1965	6.2	$ 3.6	5.7	$ 3.2	92	4.7	1.0	17.4
1966	5.8	2.9	5.4	2.5	92	3.2	2.2	41.1
1967	4.9	3.1	4.4	2.7	91	1.9	2.5	56.6
1968	7.5	5.4	6.2	4.4	82	2.9	3.3	53.2
1969	8.8	6.3	7.6	5.3	86	4.1	3.5	46.1
1970	10.3	6.3	9.9	5.9	95	6.8	3.1	31.6
1971	8.9	7.8	8.2	7.0	97	4.7	3.5	43.1
1972	12.2	12.8	11.4	11.8	97	4.8	6.6	58.0
1973 (note b)	11.4	12.0	11.2	11.7	98	5.3	5.9	52.8
1974 (note b)	12.9	15.3	10.9	13.4	85	6.6	4.3	39.5
1975 (note b)	7.7	9.9	7.5	9.6	97	5.5	2.0	26.7

a) Includes waters up to 200 miles from U.S. shores.

b) Preliminary data.

APPENDIX III

APPENDIX III

TABLE 4

1975 Spiny Lobster
Landings by State (note a)

State	Pounds	Value	Percent Pounds
	(000 omitted)		
Florida	7,485	9,607	98
California	165	330	2
Hawaii	4	7	
Total	7,654	9,944	100

a/ Preliminary data.

Fishing fleet

The American lobster is fished for in offshore and inshore areas. Although both are fished for with pots (traps), otter trawl gear is also used offshore. The inshore pot boats are generally 25 to 35 feet long, make daily trips, and use wooden pots. The offshore pot boats range from about 46 to 60 feet, make trips that generally last from 2 to 5 days, and use pots of either wooden or metal construction. The offshore trawlers generally range from 60 to 100 feet and average between 7 and 10 days per trip.

Since trawl gear is suitable for catching other species, many of these vessels enter or leave the fishery according to the current prospects for the most profitable type of fishing. The use of trawl gear declined in the 1970s as use of pots in the offshore fishery increased.

As shown in table 5, there were large increases in the number of lobster boats and pots between 1964 and 1973.

APPENDIX III

TABLE 5

Number of American Lobster
Boats, Vessels, and Pots

Year	Pot fishery Boats	Pot fishery Vessels	Trawl fishery Vessels	Total vessels, boats in trawl and pot fisheries	Pots (000 omitted)
1964	6,965	63	75	7,103	904
1965	7,252	69	88	7,409	949
1966	6,858	56	87	7,001	947
1967	6,720	58	135	6,913	908
1968	7,027	78	150	7,255	966
1969	7,649	79	140	7,868	1,062
1970	8,658	98	138	8,894	1,455
1971	8,735	141	119	8,995	1,565
1972	9,276	172	81	9,529	1,792
1973	10,141	168	64	10,373	2,165
1974 (note a)	N/A	N/A	N/A	10,278	2,159

[a]/Preliminary data.

The spiny lobster fishery is primarily a trap fishery. The traps, usually made of wood slats, account for over 90 percent of the catch landed in Gulf of Mexico States. Inshore craft are small ranging 20 to 35 feet long, and trips are made on a daily basis with catches landed alive. Distant water vessels range from about 45 to 70 feet, make extended trips, and generally land only lobster tails. Between 1964 and 1974, as shown in table 6, the total number of boats and vessels in the Florida fishery almost doubled.

APPENDIX III

TABLE 6

Number of Spiny Lobster
Boats, Vessels, and Traps

Year	Boats	Vessels	Boats and vessels	Traps
1964	294	47	341	113,653
1965	286	46	332	138,900
1966	376	112	488	150,970
1967	388	140	528	185,925
1968	187	265	452	168,390
1969	235	205	440	164,655
1970	266	226	492	219,100
1971	250	270	520	225,862
1972	275	324	599	272,495
1973	269	402	671	304,490
1974(note a)	N/A	N/A	658	405,700

a/Preliminary data.

Products and processing

The bulk of the American lobster catch is sold alive or cooked just before consumer sale. Lobsters deteriorate in quality very rapidly after death. Consequently, lobsters must be delivered live and in sound condition to shore establishments for holding, shipment, or for further processing. To keep the lobsters alive aboard offshore boats and in holding areas, circulating sea water tanks are required. Inshore boats making daily trips may or may not have holding facilities.

Processing ashore is essentiallv a holding operation prior to distribution of live lobsters to wholesale and retail markets. Processors estimated that about 10 percent of the lobsters are processed further. Most of these lobsters are boiled and the meat removed (shucked) by hand. The meat is sold in fresh or frozen form. Lobster meat is often used by food processors in various lobster dishes such as bisques, soups and newburgs.

Almost all spiny lobsters are sold frozen of which about half of the production is sold whole, either raw or cooked. The remainder are marketed as tails, whole or split. Spiny lobsters caught by small craft which make daily trips are landed alive. Distant water vessels which make extended trips generally land only lobster tails. There is no automated processing in this fishery, with the little processing necessary done by hand.

Markets

The largest markets for live American lobsters are concentrated in the Northeastern portion of the United States close to the fishery. However, lobsters are being shipped to all 50 States. Most of the lobster wholesaling and processing firms are located in New England, close to domestic supplies and points of entry for Canadian imports. Boston and New York City are the major distribution centers.

About half of the total domestic lobster supply is landed in the United States while the remainder is imported from Canada. For example, in 1973 domestic landings of 29 million pounds accounted for 53 percent of the total supply of 55 million pounds of lobster. Most of the total supply is consumed domestically with only a small percentage exported.

During the period 1965 to 1973, total annual supply declined by about 16 percent from 65 to 55 million pounds. Exvessel prices in this time period rose steadily from $0.75 to $1.37 per pound in Maine.

Domestic markets for spiny lobster have been strong, with domestic consumer demand much greater than the U.S. spiny lobster catch. Imports have accounted for the majority of U.S. supply. For example, in 1974 spiny lobster imports of 132 million pounds, valued over $150 million, represented about 91 percent of the supply. The principal countries exporting spiny lobster to the U.S. are Australia, Brazil, Republic of South Africa, and New Zealand with about one-third coming from Australia.

Most of the imported lobster is frozen, but a small quantity is imported in cans. Between 1965 and 1974, the total annual supply available to the domestic market increased from 127 million pounds to 145 million pounds. In the same period the exvessel price rose from about $0.56 to $1.23 per pound in Florida. The United States does not export spiny lobster in any form.

Employment

The number of commercial fishermen engaged in harvesting American lobsters increased during the period 1964 to 1973 from 8,236 to 11,647 respectively. Employment data in this fishery is shown in the following table.

TABLE 7

Number of American Lobster Fishermen

Year	Trawl fishery on vessels	Pot fishery			Total fishermen trawl and pot fisheries
		On vessels	On boats and shore		
		Regular	Regular	Casual	
1964	365	92	3,708	4,071	8,236
1965	425	96	3,794	4,090	8,405
1966	414	77	3,847	3,636	7,974
1967	636	81	3,823	3,563	8,103
1968	711	131	3,948	3,771	8,561
1969	669	164	4,035	4,079	8,947
1970	633	218	4,639	4,541	10,031
1971	518	395	4,927	4,357	10,197
1972	346	511	5,166	4,752	10,775
1973	270	470	5,044	5,863	11,647

The numbers of fishermen engaged in the Florida spiny lobster fishery measured gains during 1964 through 1973 increasing from 608 to 1,574 total fishermen, respectively, as shown by the following table.

TABLE 8

Number of Spiny Lobster Fishermen

Year	On Vessels	On Boats and Shore		Total
	Regular	Regular	Casual	
1964	109	381	118	608
1965	106	469	50	625
1966	232	533	36	801
1967	299	621	27	947
1968	690	288	23	1,001
1969	509	347	29	885
1970	598	441	20	1,059
1971	746	358	45	1,149
1972	902	379	41	1,322
1973	1,133	411	30	1,574

Recreational fishing

Recreational fishermen account for a large percentage of the lobster licenses but a relatively small amount of the annual catch. Licensing practices vary among the States. In Massachusetts, for example, recreational lobster fishermen generally have had about three-quarters of the licenses but have caught less than 10 percent of the reported landings. The State of Maine, in contrast, issues only commercial lobster licenses; however, with a commercial license fee of $25, a State official believes that some of the catch is probably recreational in nature.

There are no statistics available to show the extent of the recreational harvest of spiny lobsters; however, spiny lobsters are caught by recreational skindivers.

Management control

U.S. control of the American lobster resource was assured on January 2, 1974, when the American lobster was declared a continental shelf fishery resource. This action prohibited a direct lobster fishery off U.S. coasts by foreign fishermen and required all incidental lobster catches by them to be returned to the ocean. Beyond this action, there are no Federal regulations controlling the lobster fishery.

States have management authority over the lobster fishery within the 3-mile territorial limit. Through landing laws, States have been able to partially extend their control into offshore waters. With the American lobster resource spanning 11 States and each setting regulations individually, there is considerable variation in regulations among the States. To help resolve this problem and improve lobster resource management, the States and NMFS, through the State-Federal Fisheries Management Program, initiated a coordinated lobster management effort in 1972. While some improvements have been made, progress has generally been slow.

Florida and Georgia exercise the only management controls over the U.S. spiny lobster fishery in the South Atlantic and in the Gulf of Mexico. Current management in Florida is directed toward preservation of the species. The total catch and effort are not limited, however, because the regulations prohibit taking egg-bearing females, all lobsters with carapace lengths less than 76 mm. (about 3 inches), all lobsters during the peak-breeding season, March 31 to August 1, and also restrict the type of gear used. These regulations have the primary purpose of insuring and maintaining the lobster stocks, but do little or nothing to improve the economics of the industry.

Enforcement of these few rules is difficult because of the large area involved and the high potential gain/penalty ratio for the offender. The success of the management scheme is also limited by the natural distribution of the spiny lobsters beyond the boundaries of Florida's territorial waters. State management thus is unable to control the local high seas harvest or the international recruitment potential. There are no Federal regulations on spiny lobster fishing in the South Atlantic, off Florida, or in the Gulf of Mexico.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT

Resource availability

The American lobster is being overfished, resulting in depletion throughout its inshore range along the Atlantic coast (within the 12-mile fisheries zone). A study in one State concluded that nearly all available legal-size lobsters are caught each year. Scientific studies have also shown that existing legal minimum-size limits, considered inadequate, permit most female lobsters to be caught before they can spawn.

Stock assessments have not been sufficiently complete to establish a maximum sustainable yield (MSY) for the

entire inshore fishery. However, NMFS officials conservatively estimate the MSY at 25 to 30 million pounds per year. Although the lobster fishing effort has increased substantially, landings in the inshore area have declined. For example, landings in Maine, the leading producer State, dropped from a range of 21 to 24 million pounds in the early 1960s to 17 million pounds in 1975. Although a precise MSY cannot be established for the offshore lobster stocks because of inadequate catch statistics, an approximate amount of 7.5 million pounds per year has been estimated. NMFS officials believe that catches of offshore lobsters have been within the fishery's sustainable limits.

Based on available information, NMFS and State biologists are convinced that American lobster stocks can be better protected and supplies substantially increased through implementation of a comprehensive management program. Key elements in the program recommended by State and Federal officials in 1972, as part of the joint State and Federal management effort, included:

--Establishing a uniform minimum legal carapace length of 3-1/2 inches, which was considered to be the minimum needed to achieve optimum economic and biological objectives.

--Developing a program to effectively control entire fishing effort.

The plan also provided for establishing (1) reciprocal enforcement among States, (2) licensing and reporting requirements for fishermen, and (3) escape vents in traps for undersized lobsters. The plan recommended prohibiting (1) landing of lobster meat, (2) notching 1/of female lobsters, (3) possession of egg-bearing lobsters, (4) a maximum-size limit, and (5) possession of detached lobster parts.

The trend in Florida landings of spiny lobsters from 1953 through 1973 was generally upward. The recent increases were largely due to the additional foreign-water lobsters landed from the Bahamaian fishery; however, a gradual increase in landings from U.S. waters was also occurring. During this same period there was a decrease in productivity that is, less catch per unit of effort, indicating that additional stocks are not available to provide the opportunity for growth. An MSY has not been established. There are no known commercial size stocks not being exploited.

1/Making a V-shaped cut in the tail flippers for identification purposes. It was found that such cuts make the lobster vulnerable to certain diseases.

Harvesting capability

Currently there is excess harvesting capacity in the inshore fishery. Landings in this fishery have generally declined even though there has been a large increase in the number of fishermen, boats, and pots. Accordingly, although the type of gear is efficient, the overall harvest is not very efficient. Biologists estimated that the MSY for the inshore fishery from Maine through North Carolina could be taken with about 1 million pots. In 1975 preliminary data indicates that there were 2 million pots in the fishery, or double the capacity needed. Due to the displacement of U.S. fishermen from Bahamian waters, the spiny lobster fishery also has excess harvesting capacity.

Product development and processing

Some additional American lobster products have been tried, such as boiled lobster frozen whole, but processors expect the bulk of the lobster catch to continue to be sold in the most demanded form, live or cooked just prior to sale. Lobster processors stated that major improvements to existing processing techniques are not needed. Future improvements in processing or product development for spiny lobster are not currently needed.

Marketing potential

Demand is considered strong and market prices have steadily increased for the American lobster. Increased supplies can be absorbed into existing domestic markets. The market potential for the spiny lobster also appears healthy, with demand growing steadily and market prices increasing substantially. The future demand is estimated to be greater than the foreseeable future supply potential.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT

Resource availability and management control

Improved resource availability is dependent on the implementation of an effective management program. Except for prohibiting the possession of egg-bearing lobsters, which all States adopted, implementation of the lobster management plan has been slow. This has been due to difficulties, anticipated or encountered by State administrators, in obtaining acceptance of the proposed regulations by fishermen and/or State legislatures, lack of data, and reconsideration of the need for certain regulations in some States.

Although the State-Federal management committee for lobster agreed that a 3-1/2 inch minimum carapace length was necessary to achieve optimum management goals, it concluded that implementation was not feasible for at least several years. An increase in the minimum-size lobster which could be legally harvested would initially serve to reduce supplies, and the committee recognized that it would be extremely difficult to gain the support of industry and legislative officials for such action. Accordingly, the committee set a 3-3/16 inch interim goal for all States by January 1, 1976. This was not achieved.

Existing minimum-size limitations as of July 1976, 4 years after committee adoption of the plan, are shown below:

Number of States	Minimum carapace size (inches)
6	3-3/16
3	3-2/16
1	3-1/16
1	no regulation

The original committee proposal of 3-1/2 inch minimum carapace was based on research conducted in Maine waters. Several States questioned the applicability of this study to conditions in their States. However, additional research indicated that current fishing mortality rates are too high and current minimum sizes are too low in all areas.

None of the States have adopted a plan to effectively control lobster fishing effort, but some actions have been taken. For example, since adoption of the lobster management plan, numerous bills to limit the number of licenses and amount of lobster gear have been submitted to the Maine State legislature, but none have been enacted. The legislature did, however, impose a moratorium on issuance of additional lobster licenses between May 15, 1974, and December 31, 1975. Passage of the moratorium was prompted by a challenge to a Maine statute requiring State residency of 3 years for license qualification. About 10,500 lobster licenses were issued before the May 15, 1974, deadline, a substantial increase over the 7,894 licenses issued for the 1973 season.

Massachusetts issued about 1,280 commercial lobster licenses in 1974. In July 1975 Massachusetts enacted legislation placing a moratorium on the number of inshore commercial lobster licenses. The limit was set at 1,300, with

an allowance for a 10-percent increase under certain circumstances. The legislation also provides for a lobster fishery study to develop rules and regulations for annual license limits and to control the amount of gear that can be used. An industry official stated that the State legislature will be considering bills specifying gear limits and other measures in the latter part of 1976.

The U.S. spiny lobster fishery in the Gulf of Mexico and South Atlantic waters is considered to be under intensive use. The primary obstacle limiting the growth of the spiny lobster fishery is the limited availability of spiny lobsters in U.S. waters. Also, the Bahamian Government prohibits U.S. fishermen from harvesting spiny lobsters on the Bahamian continental shelf which has been a traditional fishing area for the U.S. fleet.

The catch and the effort data which show a declining yield per each unit of effort indicates that the resource may be reaching its limits. However, there is insufficient information regarding the origin of the U.S. stocks, biological activities of the species, and catch statistics by both commercial and recreational fishermen to establish the maximum sustainable yield for the fishery. Therefore, it is not known whether the restrictions prescribed by Florida are effective.

Harvesting capability

Excess harvesting capacity in the inshore American lobster fishery limits the potential for improving the efficiency of the overall harvest. The number of boats, pots, and fishermen have increased while landings have decreased. While some steps have been taken by individual States to lessen the problem, as noted previously, effective control over fishing effort has not been achieved.

The domestic fishery for spiny lobster is also considered to have excess harvesting capacity. In addition, because Bahama recently prohibited U.S. fishing activity in their waters, the displaced U.S. fishermen are now mostly idle. Even before the Bahama situation developed, the domestic waters were already fished heavily and capital inputs into the fishery generally increased at a faster rate than landings increased, thus decreasing the output per unit of effort.

Unfortunately, these idle fishermen cannot be absorbed efficiently into the U.S. jurisdiction because of resource limitations. An analysis of what would happen if the displaced fishermen moved into the Florida waters estimated

that the catch per unit of effort would drop 28 percent due to the increased pressure on the stocks.

The Federal Government is presently assisting in allaying the financial burdens of the displaced spiny lobster fishermen. The Government has authorized $2.3 million in financial assistance which is being used to help fishermen convert into other economically viable fisheries and to help families make general economic adjustments. The program is for 1 year, and its success will not be known for some time. Three spiny lobster vessels have been converted for shark fishing but the success of this venture will not be known for a while.

Negotiations have been held with the Bahamian Government but the efforts to regain access for U.S. fishermen to these foreign waters have not been successful. A solution to this problem will be difficult if Bahama refuses to further discuss the issue.

Product development and processing

There are no major obstacles to product development or processing of the American lobster. However, processors stated that because most of the lobsters are sold alive, improper handling, particularly while they are in transit to markets, can be a problem. High temperatures, high humidity and rough treatment can increase lobster mortality. There are no obstacles related to product development or processing of the spiny lobster.

Market development

Demand for American lobsters in domestic markets is strong. Lobsters are highly valued as a food item. Expansion of the market is, however, limited by the availability of lobster resources which can be improved by better management.

Continuing market equilibrium for the spiny lobster could be threatened if the fishermen who have been displaced from the shelf grounds off Bahama crowd into the Florida grounds. These grounds are already under heavy fishing pressure as indicated by a decreasing catch per unit of effort; and additional effort could further erode the catch per unit of effort across the board for all fishermen. The end result could be to increase the cost of harvesting each lobster and to increase the retail price of lobster, which could lead to a transfer of consumer demand to imported lobster or substitutes and to idling of more lobster fishermen.

EFFECTS OF A 200 MILE LIMIT

The Fishery Conservation and Management Act of 1976 extends U.S. jurisdiction over coastal fisheries resources and provides for improved fishery management. Although the majority of American lobsters are caught within 3 miles of the U.S. coast, there is an important lobster fishery in offshore waters. Also, the American lobster is a continental shelf fishery resource. It has not yet been determined how implementation of the act will affect regulation of the lobster fisheries. This is expected to be determined once Fishery Management Councils are in operation.

The 200-mile jurisdiction will extend protection to that part of the spiny lobster fishery caught by U.S. fishing craft off the U.S. shores in the 12- to 200-mile zone. A NMFS official stated that the effect of the act on the regulatory status of the fishery would be determined when the Regional Fishery Management Councils begin their operations.

Bahama's extension of their continental shelf and prohibition of fishing on the shelf by other nations has idled about 250 U.S.-based vessels and 800 fishermen who worked the Bahamian shelf. About 50 of these vessels are crossing the Gulf of Mexico into the Caribbean trying to get established harvesting spiny lobster on the shelf areas of Guatamala, Honduras and Nicaragua. But their position on these shelf areas is tenuous because the countries could exercise jurisdictional prerogatives at any time and force these fishermen to leave.

APPENDIX III

MENHADEN

The menhaden fishery, one of the most valuable fisheries in the United States and the largest in volume of landings, is centered on the Atlantic and Gulf of Mexico coasts of the United States. In 1974 the value of menhaden landings was about $66.4 million or 7.4 percent of the national total for all species; about 2 billion pounds of menhaden were landed, which was about 40 percent of the U.S. total catch and by far the greatest in volume for any single specie.

Menhaden are used exclusively to produce meal, oil, and solubles. The menhaden industry is composed of large integrated operations with processors owning the vessels, processing plants, warehouses, and distribution systems. Generally, the same companies operate on both the gulf and Atlantic coasts.

STATUS OF FISHERY

The gulf menhaden yield greatly exceeds that of the Atlantic; over 90 percent of the catch in both areas is within 3 miles of the coast.

The average size of the gulf species at any particular age is less than that of the Atlantic species. Atlantic menhaden live longer than the gulf menhaden (10-year old Atlantic menhaden have been recorded). Most gulf menhaden caught are 1 to 2 years old; fish older than 4 years are rare.

Current harvest in the Atlantic

Landings of Altantic menhaden in the 1975 fishing season amounted to 605,770,000 pounds--11 percent less than the 683,178,000 pounds landed in 1974 and 27 percent less than 831,643,000 pounds caught in 1972. The historical peak was in 1956 at 1,537,403,000 pounds.

Annual landings of Atlantic menhaden have shown a classic response to a progressively developing fishery. Landings increased steadily to a peak in 1956, and then declined as the harvesting rate exceeded the growth rate of the menhaden population. The population and hence landings, have recovered greatly since the low in 1969. This is thought by NMFS to be due, at least in part, to a 54-percent reduction in observed fishing effort, and enhances NMFS' belief in the efficacy of controlling the amount of effort.

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The biological research program on Atlantic menhaden by NMFS and its predecessor agencies began in 1955. Major questions concerning the species in landings, population composition and migrations, recruitment patterns, fecundity, age and size of fish in landings, growth, and estimates of natural and fishing mortalities, and effects of fishing have been answered. These reports and analyses form the necessary components to the present store of knowledge and understanding of the resource and fishery.

NMFS points out that since the resource appears to be almost constantly changing and responding to fishing and to natural environmental changes, continued research on the fishery is warranted and should prove fruitful. Future research, however, will generally contribute refinements to the present understanding.

The leading Atlantic Coast States for menhaden landings before 1972 were New Jersey, Virginia, and North Carolina. Virginia accounted for about half or more of the landings.

Major Atlantic menhaden ports are:

Middle Atlantic	--	Port Monmouth, New Jersey
Chesapeake Bay	--	Readville, Virginia
South Atlantic	--	Beaufort, North Carolina Southport, North Carolina Fernandina Beach, Florida

Current harvest in the gulf

Landings of gulf menhaden in the 1975 fishing season amounted to 1,196,977,000 pounds. This catch ranks as the fourth largest ever made in the gulf fishery, surpassed only by the 1970, 1971, and 1974 catches.

NMFS had predicted a 1975 catch of 1,441,808,400 pounds a 20-percent overstatement of the actual. Poor fishing weather, moderate fish abundance, and changes in menhaden distribution along the northern gulf coast in 1975 contributed to a moderate decline in landings over 1974.

In 1973 NMFS underestimated the landings by 2 percent and in 1974 overestimated the landings by 1 percent.

Most of the menhaden catch is landed in Louisiana. Of the total menhaden landed in the Gulf States from 1948 through 1975, over 70 percent were landed in Louisiana.

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The gulf fishery began to expand in about 1947. Gulf landings show a trend since 1946 that is remarkably similar to that on the Atlantic which has generally been upward. The landings decreased in 1957 and 1958 and are unexplained as are those in the 1967 season. The record catch of gulf menhaden in 1971 exceeded the catch of any other single-species fishery in U.S. history. Since 1971 landings have declined but no trend is indicated.

Since 1963 the gulf menhaden has supported the Nation's largest fishery and in recent years has accounted for about 25 percent of the total landings by U.S. fishermen. Landings from 1963 through the 1975 season have exceeded those of the Atlantic menhaden, the original fishery, whose history goes back to colonial times.

NMFS thinks much consideration should be given as to why the gulf landings, apparently peaking in about 1970, have shown no signs yet of declining, as in the Atlantic, in the face of a technical development of harvesting and processing at least equal to the Atlantic. Part of the reason is believed to lie in imposing the increasing harvesting rates on a virgin stock, instead of on a stock already exposed to a large harvesting rate. Part of the reason may also lie in some rather overt "management" by the industry. The same industry that experienced economic disaster on the Atlantic coast appears to be closely watching and voluntarily limiting the effort. For example, after a tremendous increase in the catch in 1971 the industry reduced its effort the next year by 5 percent. Though part of the reason for a reduction may have been induced by market, labor, or processing conditions, it indicates a flexible industry that is cautiously responsive to fluctuations in the gulf, which are more apparent because there are fewer age classes in the fishery.

Biological research on the gulf menhaden resource and purse seine fishery by NMFS was started in 1964. The purpose of these studies was then, as today, to determine, as much as possible, the effects of man's fishing and catch on the well-being of the fish stock and to aid in the wise utilization and conservation of this large renewable resource. To answer this question, a research program was designed that would plan for the systematic collecting and analyzing of information from the fishery and its operation which would permit reliable conclusions about the gulf menhaden and dependent fishery.

The leading gulf menhaden ports are:

--Moss Point, Mississippi.

--Empire, Louisiana.

--Morgan City, Louisiana.

--Cameron, Louisiana.

--Intracoastal City, Louisiana.

--Dulac, Louisiana.

Products and processing--Atlantic and gulf

The gulf menhaden yield twice the oil as the Atlantic menhaden, but the same quantity of meal.

The products for which menhaden is used include fishmeal, oil, and solubles--products that are used in dozens of ways. The fishmeal is high in protein, minerals, and other essential nutrients, and is an excellent additive in poultry, swine, and cattle feed.

More than a hundred uses have been developed for the menhaden oil alone. The oil is used in bath soaps and the manufacture of lipstick, and the preparation of lard substitutes, in which huge quantities of oil are shipped to Europe for that purpose. In Europe, it also goes into the manufacture of candles, soap, leather dressing, etc. The oil is used in manufacturing paints, varnishes, stains, and large quantities are still used by the leather industry. The solubles include fluid protein and water soluble amino acids, which are important to human health.

An attempt was made during World War II to process and can menhaden for humans, but the extreme oiliness and many small bones prevented the species from reaching popularity as a table fish.

The processing of menhaden is highly mechanized. Menhaden are unloaded by pumps from the hold of the vessel and weighed and conveyed through a continuous process of steam cooking, pressing, and separation of liquids and solids. The solid portion or press cake is dried and ground into fishmeal.

The liquids are centrifuged to separate the oil and stickwater. Stickwater is further reduced by evaporation to

obtain a soluble product high in protein content, vitamins, and minerals.

The domestic production of menhaden products for selected years are shown below.

Year	Dried scrap and meal		Solubles		Oil	
	Pounds		Pounds		Pounds	
	(000 omitted)					
1960	436,846	$19,202	131,700	$2,999	183,403	$11,582
1965	351,918	25,869	146,360	4,666	175,204	13,241
1970	377,100	34,658	143,782	3,574	186,283	16,833
1971	442,008	34,969	182,482	3,773	242,071	19,268

Markets--Atlantic and gulf

Menhaden account for most of the U.S. domestic fishmeal production. Other domestic fish used for fishmeal are anchovy, tuna, and mackerel. Menhaden provides less than half of the total domestic fishmeal demand and the United States has had to import large quantities principally from Peru and Canada.

U.S. imports declined in 1973 and 1974 because Peru decreased its exports to the United States. U.S. exports of fishmeal increased dramatically during this period because prices in Europe were higher than in the United States. However, 1975 reversed the trend of 1973 and 1974.

The United States exports a major part of the domestically produced menhaden oil. The Netherlands is a major buyer, as are Sweden, the United Kingdom, and West Germany. Even though the level of 1975 oil export decreased, it was at about the same level as the 1970-74 average. FDA bans the use of menhaden fish oil for human consumption in the United States.

Fishing fleet

The number of vessels active in the Atlantic fishery peaked in the mid- to late 1950s when active vessels numbered over 100. The number of active vessels has declined since that time.

The number of vessels active in the Gulf of Mexico fishery during this same period has been comparatively steady. The most dramatic change has been in the rapid rate at which vessels have increased in average size as shown by their registered net tonnage.

The vessels are highly specialized and fish during daylight hours in relatively shallow waters, generally about 1 to 3 miles offshore.

The number of fishing vessels assigned to a menhaden plant varies with plant size and availability of fish. A plant of average size is supplied by 6 to 10 vessels.

Menhaden are caught by the purse seine method, in which a large seine (net), designed to be set by two boats around a school of menhaden, is so arranged that after the ends have been brought together the bottom can be closed. The fishing fleet includes aircraft (spotter planes) which find the menhaden and direct by radio the setting of the net. Menhaden vessels range in size from about 125 feet to 200 feet long, are built of steel and range from 150 to 700 tons. The purse seine boats are constructed of aluminum, about 36 feet long and 10 feet wide and are equipped with a diesel engine that powers the boat and the hydraulic seine block. The purse seine nets, some 1,200 feet long and about 60 feet deep, can encircle an area the size of two football fields. The fleet's mechanized catching operations are quite efficient.

Atlantic

In 1975 a total of 61 vessels were reported as landing menhaden, compared to 63 which were active in 1974 and 58 in 1973. Fifty-one vessels were active in 1969-72 and 54 in 1970.

More fishing vessels and more effort were observed in the South Atlantic in 1975 than in the 1974 season, and fewer in the Chesapeake Bay, Middle and North Atlantic areas.

--14 vessels were reported landing menhaden in the North Carolina fall fishery in 1975.

--10 were active in 1974 and 4 in 1973 when the catch was a record low since at least 1940.

Gulf

The fleet operating in the gulf during 1972 consisted of about 75 vessels, with an average age of about 13 years. The larger vessels were almost 200 feet long and carried 300 tons of fish.

In 1975 78 purse seine vessels were active in the fishing industry, an increase over the 71 vessels in the 1974 fleet. During the last 11 years, the gulf fleet has averaged 79 vessels per season, with the lowest number, 66 in 1973, and 92, the highest, in 1966.

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Employment--Atlantic and gulf

The menhaden vessel crew numbers about 16 or 17 men and includes a captain, pilot, engineer, cook, and net handlers.

The number of fishermen and employees involved in processing and wholesaling is shown below.

Year	Fishermen	Processing and wholesale employees
1960	4,353	-
1965	2,722	-
1970	2,066	909
1972	1,970	899
1973	1,850	1,165
1974	N/A	1,165

The quality of menhaden crews is deteriorating and incentives are offered to attract reliable crews. The incentives include

--minimum catch guarantee on which the wage is based,

--bonuses to those who stay with the fleet the full season, and

--modern efficient vessels with good living conditions.

Recreational fishing

There is no recreational fishing for menhaden.

Management controls

Passage by the United States of the 12-mile contiguous fishing zone in 1966 effectively prevented the entrance of foreign fishing fleets into the Atlantic and Gulf States menhaden fisheries.

Atlantic

The Atlantic menhaden fishery is under no formal management scheme. There are no regulations controlling either total effort or catch.

We were told that if any management is exercised in the menhaden fishery it is done so voluntarily by industry.

Gulf

There is no formal management control of the gulf menhaden fishery. Even though Louisiana, Texas, and Mississippi recognize a common season, no regulations or constraints

exist to control either total catch or fishing effort. All management actions are exclusively voluntary by the industry.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability--Atlantic

NMFS believes that production can be increased if the fish stocks are carefully managed. Its estimate of MSY for this resource is 881,840,000 pounds. The 1975 catch was 605,770,000 pounds.

Resource availability--gulf

NMFS's latest MSY estimate for the gulf is over 1 billion pounds. NMFS studies and analyses showed that:

--The gulf menhaden resource is healthy and producing an annual catch that is considered sustainable.

--Due to dependence of the fishery on mostly 1- and 2-year old menhaden, sizable fluctuations in annual landings should be expected.

--Major expansion in landings or in fishing effort is not suggested by the information and analyses available at this time.

--Overfishing, or the taking of excessive amounts of fish, is not indicated.

--Adequate numbers of adult gulf menhaden are presently available for spawning and to insure the future production of eggs and resulting young fish for the near term.

--The future of the gulf menhaden resource and productive fishery depends on maintaining the existing quality and quantity of estuary habitat essential for this species.

An industry representative said that the estimates of potential resources for the gulf and Atlantic seem reasonable. But, he said that others in the menhaden industry would probably not accept this data and would adamantly attack it.

Harvesting capability--Atlantic

The harvesting capability in the Atlantic menhaden fishery is adequate. NMFS believes there should be less

effort in the Atlantic fishery. Excessive fishing pressure has been cited as the primary reason for the reduction in landings in the 1960s.

An industry representative said there is excess capacity but he does not wholly agree that this excess is the primary reason for the reduction in landing. Although it may have been a contributing factor, he said that there are others in the industry who would strongly disagree about the excessive fishing pressure and cite ecological changes as the prime reason.

Harvesting capability--gulf

NMFS believes potential exists for continued growth of the gulf menhaden on a limited controlled basis. Controls would set parameters on catch, effort, and yield by season. The philosophy is to allow increased yield until the MSY is met or slightly exceeded. To accomplish this, additional vessels may be added to the gulf fleet.

An industry representative said that in his opinion this is poor management strategy. He favors better utilization of the existing vessels, which in his opinion can increase effort by about 10 percent, if the goal is to gradually approach the MSY; to avoid exceeding the MSY he would favor reducing the effort of the existing companies by the same amount across-the-board.

Product development and processing--
Atlantic and gulf

Menhaden are used widely in the manufacture of many products and the uses continue to grow. The processing methods are continually being improved.

Marketing potential--Atlantic and gulf

The market for the menhaden products is international and as such affords additional opportunities for expansion through natural market growth.

Some NMFS officials believe that if the FDA would allow the use of menhaden oil for human consumption, the menhaden oil could be marketed nationally. However, the economic impact on other oils, such as vegetable, safflower, corn, soybean, palm, and peanut, now used is not known nor to what extent oil imports would be reduced. The net effect on the U.S. balance of payments is not known.

Management controls

Atlantic

NMFS personnel believe, that in view of the fishery conditions, a management plan, biologically oriented, is necessary for the survival of the Atlantic menhaden fishery.

NMFS made a stock status analysis for 1955-69 and concluded that:

--fishing had a considerable effect on the resources,
--the stock had been diminished as a result of excess fishing, and
--the resource could recover only if the fishing rate were reduced.

NMFS personnel think that sufficient data is available to establish an adequate management plan and landings for the Atlantic menhaden could be doubled within 3 years if the industry reduced its effort by 25 percent.

The history of landings shows the benefits to be gained by regulating fishing effort at a level which will produce the maximum sustainable value.

The current industry attitude is to use a management plan that will involve cooperation between States, Federal agencies, and the industry. Consulting fishery biologists for industry also endorse management.

Gulf

NMFS believes that the MSY for gulf menhaden is being approached but cannot be certain as yet to definitely state what is the approximate MSY.

Predictive yields for the gulf menhaden are made each year by NMFS. Forecasts for the last 3 years were reasonably close to observed catches and differed from actual landings by 2 percent in 1973, 1 percent in 1974, and 17 percent in 1975. NMFS is not technically positive of the MSY for this fishery. Their opinion is, however, that future increases in effort may result in increased landings but the fishery's maximum production level should be approached with a definite plan and caution.

NMFS states that the system must not be too restrictive, but must allow for expansion, until there is clear evidence that the peak of production has been reached or slightly passed.

NMFS has suggested, through a draft management plan for the gulf, a quota system as an initial step toward managing gulf menhaden.

If the system were implemented for the 1976 fishing season, the quota established would be based on the current estimated MSY of 1,093,481,600 pounds plus an increment based on statistical confidence limits around this point estimate. Using an 80-percent confidence level, an upper MSY limit of 1,179,461,000 pounds is established as the tentative harvestable quota for the 1976 fishing season.

For this system to be effective everyone in the industry would have to comply. If one company breaks the control barrier, there could be a problem of sticking to the management plan.

NMFS thinks that there should be some enforcement authority for the catch and effort quota and that the companies should have only limited authority to adjust the catch quota.

An industry representative agreed that the time to protect the fishery is when it is healthy, and that some mangement planning and regulation would probably be needed. He cautioned, however, that the Government should not have the exclusive regulatory authority. In his opinion management should be a closely coordinated effort of all parties concerned--Federal, State and industry.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT

Resource availability--Atlantic

The menhaden resource in the Atlantic has been fully exploited, in the opinion of NMFS, and population will not sustain the past levels of fishing effort because the resource is limited as follows:

--The Atlantic menhaden resource is being fully exploited throughout its range and strong evidence is available to show that landings in recent years cannot be maintained.

--The Atlantic resource is not being utilized to provide the most pounds from the population that is present, as evidenced by the abundance of young fish in catches.

--The trend in abundance of young menhaden throughout their range has been downward for the past several years.

--In recent years, as in the 1960's, fishing pressure had reduced the number of spawning age females, affecting reproduction of menhaden.

NMFS believes that the fishing pressure has been primarily responsible for declining yields in the Atlantic, although industry contends that deterioration of the nursery areas has been a prime cause for the decline. NMFS does not discount nursery area deterioration as having some effect on reducing the size of future stocks but has found little basis for a strong supporting argument.

Gulf

The gulf menhaden yield is thought to be near its peak, which would limit potential harvest, but some growth is possible. There is concern that the growth be controlled and measured.

Harvesting capability

Atlantic

Indications are that the harvesting capability exceeds that which is needed to catch the resource available. NMFS says that the fishing effort is presently greater, about 25 percent, than what is required to achieve MSY, and could do irrepairable damage to the number of harvestable menhaden.

Gulf

The capability is no obstacle for the gulf fishery at this time. The MSY is thought to be close, in which case the growth of harvesting capability would be limited by the resource available to harvest.

Product development and processing

No obstacles exist in product development and processing.

Market development

No obstacles exist in menhaden market development. The market is developed; only the supply of menhaden is limited.

Management controls--Atlantic and gulf

There are no management controls.

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EFFECT OF A 200-MILE LIMIT ON THE FISHERY

Menhaden are caught almost exclusively within the 12-mile contiguous fisheries zone and are already protected from foreign fishing fleets. Establishment of the 200-mile limit will have no effect on the menhaden fishery.

There is no foreign activity in the menhaden fishery and U.S. menhaden vessels are not active in any foreign waters.

An industry official said that even though available statistical data shows no foreign activities of menhaden in the 12-to 200-mile zone and beyond, some may exist. Menhaden have been observed on foreign vessels on occasions when vessels were boarded for inspection. There is no supporting data for this.

OTHER MATTERS FOR CONSIDERATION

Since the populations of menhaden in the gulf and Atlantic fisheries are close to full exploitation, the only opportunity for further major development of the fishmeal industry seems to be in using the thread herring population in the gulf.

This resource is thought by NMFS to exceed menhaden and might be harvested with menhaden vessels because the thread herring resources are harvested at periods when the menhaden is not.

The thread herring product is equal in quality to the menhaden and the feasibility of production and processing was illustrated in the mid-1960s when a processing plant was built in Florida for thread herring; but, Florida legislation prohibited purse seining in State waters.

OYSTER

Oyster fisheries are found on the Atlantic, gulf, and Pacific coasts of the United States. Three species of oysters are harvested commercially. The eastern oyster is harvested principally along the Atlantic and gulf coasts from Massachusetts to Texas and the Pacific and western oysters are harvested along the Pacific coast from California to Alaska.

Oysters are bivalve mollusks. They are sedentary, attaching themselves to clean, hard surfaces in bays and inlets. In some areas, oysters grow between tidal levels where they are exposed to the air during low tide. The oyster fishery is exclusively in the territorial sea within the States' jurisdiction. In the United States, about 40 percent of oyster production comes from private aquaculture--private industry growing aquatic animals for commercial purposes.

STATUS OF THE FISHERY

Current harvest[1]

In the early 1900s Atlantic coast oyster production declined drastically due to overexploitation. Since about 1935, production has decreased at a slower rate. Landings averaged about 50 million pounds per year in the 1950s and declined to an average of 28 million pounds per year in the 1960s and 1970s (see table 1). A major reason for lower production during the last two decades was a severe oyster disease known as MSX. This disease killed large numbers of oysters in the higher salinity areas of the Middle Atlantic and Chesapeake Bay, particularly in Virginia, Delaware, and New Jersey. Environmental changes caused by floods and pollution and lower return on investments in oyster growing areas also contributed to the decline.

In 1975 oyster landings along the Atlantic coast were 26.6 million pounds valued at $25.1 million, accounting for about 50 percent of total U.S. oyster production. Landings from the Chesapeake Bay area (Maryland and Virginia) were 21.5 million pounds, or 81 percent of Atlantic production. In 1972 about 70 percent of the Atlantic coast oyster landings, excluding Florida, were harvested from public beds, primarily in Maryland. Landings in most of the other Atlantic States were taken primarily from private beds. In 1973

[1]The latest data available was used in all cases.

the Atlantic eastern oyster fishery ranked ninth in volume and fifth in value among fisheries along the Atlantic coast.

In 1975 oyster landings along the gulf coast were 19,639 million pounds, accounting for 37 percent of the U.S. oyster production. The State of Louisiana has been the largest producer, with 1974 production at 10 million pounds worth $6.3 million. Most of the oysters landed in the Gulf States, with the exception of the State of Louisiana, are harvested from public beds.

In 1972 the gulf oyster fishery ranked sixth in volume and fourth in value among the Gulf States' fisheries.

In 1975 oyster landings along the Pacific coast were 6,977 million pounds, accounting for 13 percent of the U.S. oyster production. The State of Washington has been the largest producer, and small quantities have been harvested in Oregon, California, and Alaska. The Pacific coast oyster production has declined since 1959, when 12.3 million pounds were landed. In 1972 oyster production ranked seventh out of nine in dollar value among the Pacific coast fisheries. Table 1 shows U.S. oyster landings for all regions from 1950 to 1975.

Table 1

U.S. Oyster Landings By Region, 1950-75
(Meat weight)

Year	Atlantic	Gulf	Pacific	Total all region (note a)
	(thousand pounds)			
1950	55,886	12,292	8,239	76,415
1951	52,761	11,519	8,709	72,990
1952	57,506	14,637	10,100	82,242
1953	56,465	12,836	10,418	79,719
1954	59,510	11,443	10,969	81,922
1955	51,954	13,881	11,680	77,515
1956	50,692	13,513	11,928	75,134
1957	45,689	14,307	11,662	71,658
1958	44,753	10,407	11,235	66,396
1959	38,617	13,721	12,372	64,710
1960	32,884	16,098	11,028	60,070
1961	33,858	18,240	10,207	62,305
1962	26,445	18,838	10,754	56,037
1963	24,514	24,139	9,791	58,444
1964	27,176	23,385	9,953	60,534
1965	26,367	19,156	9,165	54,688
1966	26,214	17,182	7,827	51,223
1967	30,471	21,747	7,739	59,957
1968	27,377	26,739	7,770	61,886
1969	25,461	19,765	6,973	52,199
1970	27,897	17,714	7,991	53,602
1971	29,558	20,266	8,144	57,938
1972	29,398	18,260	8,400	56,058
1973	30,418	14,914	6,599	51,931
1974(note b)	27,565	13,652	3,656	44,873
1975(note b)	26,547	19,639	6,977	53,163

[a]Some total figures do not add due to rounding.

[b]Preliminary.

Products and processing

Oysters are marketed fresh in the shell or in various forms after the meat has been removed by a process called shucking. Oyster meats are sold fresh (raw), frozen (plain or breaded), and canned.

Raw oysters must be shucked by hand, a slow and difficult process. Hand shucking has been used for many centuries and is still the predominant method in use. The shucker inserts a knife into the oyster and cuts the muscle attached to the shell. The shucked oysters are then graded by size, cleaned, and packed for sale. Oysters may also be shucked by steaming open the shell which allows the meat to be easily removed and prepared for canning. Meats from the steamed oysters are of no use on the fresh market and are primarily used in soups, chowders, and stews.

Markets

Oysters are distributed evenly throughout the Nation, with oysters in the shell marketed mainly in the coastal States. In some cases shucked oysters are placed on half shells and sold as fresh opened oysters.

Oyster consumption is greatest during September to April, when most of the catch is landed. This reflects the fact that oysters are chiefly consumed fresh and that many believe oysters are unsafe to eat in other months.

Oyster imports have increased greatly since 1955 when about 1.4 million pounds of meat worth $686 thousand were imported. By 1973, imports had grown to 18.5 million pounds, valued at $12.6 million, and accounted for 29 percent of the oysters consumed in the United States. (See table 2). Canned oysters make up the bulk of the imports.

The United States does not export a large amount of oysters.

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Table 2

Quantity and Value of Oyster Imports to the United States, 1955-73(note a)

(Meat weight (pounds))

Year	Fresh and frozen (note b)	Canned (note c)	Total	Value (all forms)
	(000 omitted)			
1955	23	1,368	1,391	686
1956	141	1,787	1,928	869
1957	86	2,489	2,575	1,028
1958	13	5,002	5,015	1,587
1959	4	5,536	5,540	1,965
1960	64	6,533	6,597	2,302
1961	99	7,162	7,261	2,496
1962	105	7,282	7,387	2,883
1963	1,035	7,871	8,906	3,706
1964	743	7,411	8,154	3,320
1965	968	8,003	9,001	3,842
1966	854	11,174	12,028	5,054
1967	2,686	14,986	17,672	6,912
1968	2,066	13,484	15,550	6,528
1969	1,072	15,550	16,622	7,319
1970	1,578	13,906	15,484	9,356
1971	905	8,790	9,695	7,879
1972	2,920	19,389	22,309	15,842
1973	1,877	16,631	18,508	12,580

a/Source: Imports and Exports of Fishery Products, Bureau of Census 1955-73.

b/Conversion factor for imported oysters to meat weight is 0.75.

c/Conversion factor for imported canned oysters to meat weight is 0.93.

Fishing fleet

Oysters are harvested by dredge, tongs, rakes, and by hand. Between 1960 and 1972 the number of vessels used to harvest oysters on the Atlantic coast (excluding Florida) increased from 745 to 1,197 while the number of boats declined from 5,972 to 3,382.

Oysters are harvested in the Gulf States by dredging or hand tonging from boats and vessels ranging from rowboats to shrimp vessels. In Louisiana, oyster boats designed for harvesting are used by most of the fishermen. These boats are flat decked and are about 50 to 80 feet in length. Most Louisiana and Texas fishermen use dredges, whereas almost the entire oyster harvests in Florida and Alabama are hand tonged. Both methods are used in Mississippi. NMFS statistics show that for 1972, 1,374 dredges and 1,769 tongs were used to harvest 72 and 27 percent of the Gulf States' production, respectively. The harvest involved 1,887 boats and 526 vessels.

Vessels in the Pacific coast oyster fishery are used primarily as dredge platforms. The operation size determines the vessel and equipment used.

Employment

The number of fishermen has been declining since 1960 when about 10,500 fishermen were employed. In 1972, 6,827 fishermen were employed in the Atlantic coast oyster fishery, excluding Florida. About 5,500 fishermen harvested oysters with tongs, rakes, or by hand, relatively inefficient harvesting methods. Employment data for oyster processing is not readily available; however, according to State and industry officials employment in oyster processing plants has also declined.

NMFS reported that there were 3,990 fishermen involved in the Gulf States' oyster fishery in 1972. Figures were not available on employment in processing and wholesaling. Employment in the oyster fishery ranges from full time to part time. Most Louisiana oystermen work oysters on a full-time, year-round basis, while in Texas, most of the oyster harvesting is done by fishermen who are primarily shrimpers. Around Florida's largest oyster producing area, Apalachicola Bay, many people are engaged principally in oystering. The productivity of Florida oyster fishermen is low because those engaged in the industry use inefficient harvesting methods.

On the Pacific coast, the labor force is made up of families and small businesses who work together and hire

additional labor during peak working periods. Some processors own oyster farms and employ people yearround. Figures are not available on employment in processing and wholesaling.

Recreational fishing

On the Atlantic and Pacific coasts the recreational catch is small and does not have a large effect on the commercial oyster fishery.

In the Gulf States conflicts between recreational and commercial fishermen are expected, due to increased recreational fishing as oyster prices and population pressures increase.

Management controls

Oyster resources are located inside the 3-mile territorial limit and thus are managed by the States. Considerable variation exists among the States, but generally, regulations cover minimum shell size at harvest, harvesting methods, seasons, and leasing of private beds. Improvement of oyster beds, through repletion programs, is also a concern of management. To survive, oysters need a clean hard surface, such as old shells, to which they can become attached; some shells are planted in the growing areas. In areas where natural reproduction is insufficient or does not occur, seed oysters are planted.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Resource availability can be increased by improvement of oyster grounds, seed hatcheries, and aquaculture techniques. It is affected by a combination of natural factors, such as salinity changes and diseases; and man-induced changes, such as overexploitation, and bacterial and industrial pollution.

Biologists in Maryland and Virginia estimate that resource availability in the Chesapeake Bay can be increased up to 10 times the current level if adequate investments are made to enhance potentially productive areas.

According to a 1973 study, Apalachicola Bay, which accounts for more than 80 percent of the Florida landings, contains about 46,000 acres suitable for growing oysters. However, commercially harvested acreage only amounts to

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about 6,000 acres. Output in the bay could be increased through reef planting and enrichment. Additional gains are possible from relaying; that is, regularly taking oysters from poor growing areas and placing them in more suitable environments; reef cultivation and redesign; disease and predator control; preventing undesirable ecological changes; and promoting ecological changes helpful to the fishery. These management techniques are applicable to other areas as well.

Opportunities also exist for increased production of the Pacific coast oyster. The resource is seeded, grown, and cultivated in bays and estuaries; the more area seeded with young oysters, the higher the production potential.

Increased development of State and private oyster seed hatcheries would offer a chance for selective breeding and improvement of the basic oyster stock. The hatcheries would also provide a source of seed oysters. Given increased demand at profitable price levels, production could be greatly increased.

Harvesting capability

Atlantic, gulf, and Pacific coast oyster fishermen have the vessels and gear for harvesting available oyster resources, but efficiency could be improved. For example, dredges could be used in place of less efficient manual methods, such as hand tonging.

Product development and processing

An automated shucker capable of processing raw oyster products is needed. Several have been developed but none have been commercially successful. New methods could cause a processing breakthrough for the industry.

Product development has proceeded slowly, with most oysters sold to the consumer in a fresh-shucked form. Some convenience foods, such as breaded oysters, oyster soups and chowders, and stews are produced. Oyster meat is a unique product with potential for wide consumer acceptance. Using cooked oysters NMFS researchers developed several frozen product forms including oyster blocks, oyster stuffing, oyster casserole, and oysters in cocktail sauce; and even more can be developed. Product forms meeting the needs of the consumer and restaurants and having long shelf life appear to have the highest potential for success.

Marketing potential

Due to the many small processors, industry promotion is relatively low. Some State agencies have helped with oyster promotional campaigns, but State and industry officials believe that oyster promotion has been insufficient. These officials expressed concern that many young adults are not eating fresh oysters and that as a result the demand in this traditional market may be declining. Other factors affecting consumer demand include: the desire for more conveniently packaged and easy to prepare products, the belief that oysters are a seasonal, luxury product, and consumer reluctance to eat oysters due to publicity about bacterial and chemical pollution in their growing areas.

Since most promotional efforts have been directed at the industry's principal product, the fresh oyster, opportunity exists to expand promotional activities to other product forms. Demand for these products may prove sufficient to attract additional investment in oyster production and processing activities.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT

Resource availability

Production of oyster resources can be greatly expanded. However, aside from unusually large natural population increases, investments in enhancement programs are necessary. Increases in production costs resulting in lower rates of return, lack of high-quality oyster seed supplies, and a high risk of loss due to disease, predators, floods, and pollution continue to block investments in private beds.

Private lease holders in some Atlantic States have only been assigned marginally productive areas to cultivate. Several States have programs to improve oyster beds in potentially productive public areas; however, State officials said that funding for this purpose is limited. Even though the harvest of oysters from public areas is taxed to support repletion programs, the funds are insufficient to improve many potentially productive areas. Many State officials and resource studies conclude that if such areas were leased, investment, production, and harvesting efficiency would increase.

Oyster production in the Gulf of Mexico is affected by salinity of the water and mortality by predators; too much or too little salinity and oysters cannot survive.

The major production areas of Louisiana and Mississippi suffer from salt water intrusion which is becoming a bigger problem each year. In Texas, the major production area, Galveston Bay, suffers from fresh water flooding, causing production to fluctuate seasonally and yearly. Alabama production areas suffer from both salt water intrusion and fresh water flooding.

The adverse effects of pollution in growing areas are another obstacle to oyster production. The James River in Virginia is an example of one highly productive oyster area being affected. A research study by the Virginia Institute of Marine Science indicates that chlorine from a sewage treatment plant has contributed to declining oyster production in the river. Tests showed that chlorine levels in parts of the river were found to exceed the amount fatal to oyster larvae in the laboratory. A pesticide known as kepone had also been discharged into the river. Due to this contamination, on December 17, 1975, the Commonwealth of Virginia prohibited the taking of shellfish from the James River and its tributaries from Richmond to the mouth at Chesapeake Bay. On May 21, 1976, the restriction on harvesting shellfish in the James River was removed.

Bacterial pollution has also resulted in the closing of oyster beds. In one State about 180,000 acres of shellfish growing areas have been closed to harvesting. Officials there said that while much of the area is not natural oyster ground, it includes some highly productive areas, one of which contains about 50,000 acres. Oysters can be transferred from polluted waters to clean waters and reharvested after they have been purified, but harvesting twice increases the cost, making this practice uneconomical.

In Louisiana, 33,000 acres suitable for oyster production are closed. The richest production area in Mississippi, Biloxi Bay, is closed to harvesting, as are parts of Texas' largest production area, Galveston Bay. In Florida, 58 percent of the shellfish waters of the State are closed because of unacceptable water quality. This is the principal cause of shellfish shortages in that State. Along the Pacific coast the entire oyster yield comes from private farms. The fishery is not limited by resource availability but future growth and development depends on suitable environments, consistent oyster seed supplies, and continued biological research.

Harvesting capability

The Atlantic oyster fishery has highly mechanized gear available for harvesting, but it cannot be used to its full

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capacity. While no limits are placed on the amount of gear in public oyster areas, States generally regulate the type of gear allowed. For example, patent tongs and oyster dredges are prohibited in most public areas in one State, and where they are allowed, daily catch quotas are in effect and dredge size is limited. Dredges have to operate under sail power except for 2 days a week when motor power is allowed.

State officials explained that to meet management goals for public areas harvesting regulations, such as protecting and enhancing oyster resources, maintaining employment opportunities and a traditional culture for large numbers of people, and minimizing conflicts among users of the resource are necessary. These goals are not specifically stated in laws or regulations, but can be inferred from their effects on the oyster fishery. In contrast, regulation of private growing areas involve relatively few restrictions. The capability to harvest oysters is also impaired by restrictive State regulations and the protective attitudes of the fishermen in the gulf.

The prohibition against dredges in the tricounty area around Apalachicola Bay, Florida, is the result of a desire to spread the available resource among as many persons as possible and eliminate improper use of gear which damages natural reefs. Texas prohibits the use of more than one dredge per boat, of a size no greater than 36 inches across, to discourage exploitation by Louisiana oystermen.

On the Pacific coast, the extensive use of hand labor inhibits growth and development of the oyster fishery.

Product development and processing

An oyster's shell is hard to open and this makes processing oysters in a raw form difficult. In the Atlantic and Gulf States, processing is done mainly by hand which is not easily available, particularly in periods when demand and supplies are at high levels. Processors explained that many persons do not want to shuck oysters because wages are relatively low, employment is seasonal, and the work is laborious and often messy. They also believe that competition from other types of jobs, welfare, and unemployment compensation limit the number of people willing to shuck oysters. Due to labor supply problems the need for machine processing of raw oysters is increasing, but development has been hindered by the wide variations in oyster size and shape.

On the Pacific coast, oyster processing is laborious and an automatic oyster shucker is needed.

The oyster industry has been slow to introduce new products. The industry is made up of many small processors who claim that they are undergoing a cost-price squeeze which prevents them from accumulating the capital needed to invest in product development and new processing techniques.

Market development

On the Atlantic coast reduced oyster resources have hindered prospects for market development. Enhancement of oyster grounds could improve resource availability; however, with many small units in the industry and limited State funding, there is a lack of capital available to substantially increase investment in improvements, promotional activities, product development, and mechanical processing equipment. Industry members are independent and are reluctant to join together in cooperative activities.

In the gulf, perishability of the oyster and its unfamiliarity outside coastal areas are the main reasons for the decline in oyster per capita consumption.

While oysters sell as a speciality item, half shell and fresh-shucked oysters do not fit the fast food merchandising needs of the modern restaurant, nor the convenience requirements of the modern household.

The Pacific coast oystermen do not have the capacity to promote their product. A cooperative effort is needed that would provide improved distribution and marketing systems.

The future growth and development of the Pacific coast oyster industry may be jeopardized by Korean imports. From 1972 to 1973, U.S. imports of Korean oysters increased 60 percent. The current bilateral fishing agreement with Korea allows importation of canned, smoked, steamed, boiled, and frozen oysters. Fresh-shucked and live oysters are not permitted for importation because of a shellfish disease. When this problem is resolved, the Republic of Korea may be allowed to export fresh, shucked, and live oysters to the United States. According to an NMFS official, west coast oystermen may not be able to compete with the low Korean prices.

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EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

The U.S. oyster fishery is totally within State jurisdiction and thus is not affected by the enactment of the 200-mile limit.

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SALMON

Five species of Pacific salmon comprise the fishery: chinook, chum, pink, coho, and sockeye salmon. In 1975 the pink and chum salmon accounted for about 45 percent of the U.S. commercial landings. Sockeye salmon accounted for about 26 percent and is considered the most valuable species for canning purposes. The chinook and coho salmon are the least abundant of the species and are important for commercial troll and sport fisheries.

The U.S. commercial salmon fishery, located along the Pacific coast from California to Alaska, employs more vessels and fishermen than any other U.S. commercial fishery. Landed value of salmon has ranked first or second among all finfish fisheries between 1940 and 1975. In 1975 salmon also ranked first in value of fish products exported from the United States.

STATUS OF THE FISHERY

Current harvest

U.S. landings of Pacific salmon in 1975 were 201.6 million pounds worth $116.3 million--a gain of 4.8 million pounds, but a decrease of $5 million in value compared with 1974. The 1975 harvest was the second smallest since 1915, when 120.4 million pounds were taken, and was below the 1970-74 average of 278.4 million pounds. The following table shows the 1972 U.S. commercial salmon catch by species and by State.

Table 1

U.S. Commercial Salmon Catch for 1972 (note a)

States	Species											
	All species		Sockeye		Pink		Chum		Coho		Chinook	
	(000 omitted)											
Alaska		31,959		6,590		15,920		7,065		1,831		553
Western	4,468		2,600		177		1,397		70		224	
Central	9,437		3,073		3,344		2,726		252		42	
South-eastern	18,054		917		12,400		2,942		1,509		287	
Washington		3,864		1,227		4		895		1,253		486
Oregon		1,293		43		<0.5		1		925		324
California		650		-		<0.5		-		158		492
Total (note b)		37,766		7,860		15,924		7,961		4,167		1,855

a/Expressed in numbers of fish.

b/Totals may not add due to rounding.

Source: International North Pacific Fisheries Commission 1972 Statistical Yearbook.

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Products and processing

The salmon fishery produces a wide variety of food and industrial products with all parts of the salmon being utilized. All five species of salmon are canned; other popular forms are steaks, fresh or frozen fillets, and smoked or salted. Only chinook and coho salmon enter the fresh and frozen market in quantity, though pinks and chums are occasionally used to substitute for seasonal gaps in supply. Salmon eggs (roe), once considered a worthless byproduct of Alaska's salmon fishery, now provide millions of dollars to the States of Alaska and Washington. In 1972 the two States processed about $12 million of salmon roe. Fishmeal and fish oil are also produced. Table 2 shows the major salmon products produced in 1972 for the States of Alaska, California, Oregon, and Washington.

Table 2

Value of Major Salmon Products for 1972 (in millions of dollars)

Salmon products	Value
Canned	$ 89.8
Caviar--egg roe	11.9
Smoked	5.6
Fresh/frozen	5.1
Salted	2.3
Total	$114.7

Source: U.S. Department of Commerce, National Marine Fisheries Service, Fishery Statistics of the United States, 1972.

Living Marine Resources, Inc., reported that an industry survey in late 1973 of 82 salmon processing plants in Alaska, Washington, Oregon, and California indicated a total replacement value of $191 million for cannery facilities and support operations.

Salmon canneries vary in size and age. According to an industry official, canning capacity is adequate in Washington, Oregon, California, and in most areas of Alaska. He indicated that, in the event of a large unexpected salmon run, the canning capacity in any one area may not be adequate to harvest all the fish. During large runs, the canneries must also work "around the clock" because the Pacific salmon deteriorate rapidly once caught and must be processed quickly if their initial high quality is to be maintained.

After the salmon have been caught, fishing vessels often transfer their fish by hand to tender boats which take them to the cannery. Fishing vessels, however, can take their catch directly to the cannery. In the cannery, automation takes over. The fish are placed on a conveyor belt and automatically beheaded, finned, split, and gutted while at the same time being cleansed by water jets. The belt carries the fish to knives that cut the salmon into can-size pieces and filling machines place the chunks of salmon into cans. Much of the hand labor has been eliminated.

Markets

U.S. aggregate consumption of salmon in 1970 was 188 million pounds: 137 million pounds canned and 51 million pounds noncanned. Per capita consumption was .922 pounds; an increase over the past 4 years, but still lower than a high of 1.8 pounds in 1949. From 1960 to 1972, per capita consumption of canned salmon remained quite stable at an average of .77 pounds. During 1973-74, average canned salmon consumption was .3 pounds per person. From 1960 to 1970, the average ex-vessel price of all species increased from 19 to 24 cents a pound. By 1974 the average ex-vessel price of salmon had increased to 62 cents a pound.

In 1975 the United States imported 9.2 million pounds of fresh and frozen salmon and 3.3 million pounds of canned salmon, for a total value of $15.4 million dollars. Canada and Japan were the principal suppliers.

In 1975 the U.S. exports of salmon--fresh, frozen, and canned--were worth $101.4 million. Approximately 10 percent of the U.S. canned salmon and 35 percent of the fresh and frozen salmon are exported. According to NMFS officials, the demand for fresh, frozen, and canned salmon is good and probably will continue. Economical jet air service to domestic and foreign markets is creating additional demand for fresh and frozen salmon.

Fishing fleet

The Pacific salmon are taken commercially in a variety of ways--by purse seines, by drift and anchor gill nets, by trolling gear, and, on a very limited scale, by reefnets and fish wheels. In 1972 purse seines and gill nets accounted for about 88 percent of the salmon catch. Table 3 shows the number of vessels and boats by State and gear type.

Table 3

Summary of Salmon Vessels and Boats for 1972

Type of gear	Alaska	Washington	Oregon	California	Total, exclusive of duplication (note a)
Purse seine	1,048	192	(b)	(c)	1,147
Gillnet (anchor)	2,525	331	199	(c)	3,055
Gillnet (drift)	4,051	1,476	514	(c)	5,962
Troll	1,895	2,703	1,714	1,795	7,705
Total	9,519	4,702	2,427	1,795	17,869

a/ A vessel can be licensed in more than one State. Consequently, column figures may or may not equal the sum shown in the total column.

b/ Use of purse seines prohibited.

c/ Use of purse seines and gillnets prohibited.

Source: National Marine Fisheries Service, Fishery Statistics of the United States, 1972.

Employment

The Pacific salmon fishery supports more fishermen than any other U.S. fishery. In 1972 NMFS reported that 28,709 fishermen were in the fishery. With the enactment of State laws in Alaska and Washington, which established programs to limit the number of fishermen or vessels in the salmon fishery, the number of fishermen should eventually stabilize. The number of fishermen and their respective gear, for 1972, is shown in table 4.

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Table 4

Number of Fishermen by Gear Type and State 1972 (note a)

	Alaska	Washington	Oregon	California	Total
Purse Seine	5,360	1,195	(b)	(c)	6,021
Gillnet (anchor, set, stake)	2,556	417	199	(c)	3,172
Gillnet (drift)	4,860	1,689	514	(c)	6,964
Troll	3,767	3,452	2,470	3,590	12,552
Total	16,543	6,753	3,183	3,590	28,709

a/ A fisherman can be licensed in more than one State. Consequently, column figures may or may not equal the sum shown in the total column.

b/ Use of seine nets is not permitted.

c/ Use of gillnets is not permitted.

Source: National Marine Fisheries Service, Fishery Statistics of the United States, 1972.

In addition to the number of fishermen working in the Pacific salmon fisheries, about 7,000 people, according to a 1974 report prepared by Living Marine Resource, Inc., were employed in the salmon processing operations.

Recreational fishing

The United States and Canada maintain large and important recreational fisheries for Pacific salmon. Nearly 2 million salmon are caught annually by approximately 1 million fishermen. Public participation in sport salmon fishing is continually increasing along the Pacific coast.

An NMFS report showed that the salmon sport fisheries' average annual expenditure from 1965 to 1970 was conservatively estimated at $28.6 million. In 1973 Washington, Oregon, and Idaho reported 880,138 salmon anglers.[1/] These fishermen caught about 1.5 million fish, with most fishing concentrating on the chinook and coho salmon. In 1973 the State of Washington had the largest recreational salmon catch, accounting for about 45 percent of the total Pacific sport salmon catch. The State of Washington estimated $42.2 million in expenditures were due to the sport salmon fishery in 1973.

A Washington State fishery official said that the effect on the commercial harvest of salmon by recreational fishermen is significant in Washington and Oregon. An Alaska State Fish & Game official said that recreational salmon fishing does not presently have a serious widespread effect on Alaska's commercial salmon fisheries. He said, however, that in the vicinity of the major population centers, the recreational fishing pressure is strong and commercial fishing for sport target species has been restrained.

Management controls

Five States, various Indian tribes, and the Federal Government all exert some control over the Pacific salmon fishery. In 1953 the Congress passed the Submerged Lands Act, granting coastal States the rights and powers to manage, administer, develop, and use their natural resources. This gave the States of Alaska, Washington, Oregon, and California jurisdiction over fishery resources. These States have jurisdiction over fishery resources in the 0-3 mile territorial waters of the United States (as well as jurisdiction over their own citizens engaged in fishery activities, even though those activities take place beyond the territorial limits of

[1/]Figure includes steelhead fishermen in Idaho.

the State. According to NMFS, before passage of the Fishery Conservation and Management Act of 1976, no clear authority for management by either the States or the Federal Government existed in the Contiguous Fisheries Zone (3-12 miles) and the resources beyond 12 miles were controlled only through international bilateral or multilateral agreements.

Our discussion of management controls at the State level will be limited to the State agencies of Alaska and Washington, recognizing that the other States of Oregon, California, and Idaho also have natural resource management agencies.

Salmon in Alaska

In Alaska, prior to statehood, the salmon resource was managed by the Federal Government. With statehood in 1959, management authority was transferred to the State. The Department of Fish and Game administers the State program for the management, conservation, and development of the commercial fishing, sport fishing, and game resources.

The State Board of Fish and the State Board of Game are seven-member boards appointed by the Governor. These boards establish open and closed seasons and areas, the means and methods used in pursuing, capturing, and transporting fish or game, and their limits and quotas. The Department of Public Safety is responsible for patrolling and enforcing State fishing regulations.

The Alaska Commercial Fisheries Entry Commission is a regulatory agency created by the 1973 legislature. The Commission's objectives are to promote conservation and sustained yield management of the fishery resource for the economic health and stability of commercial fishing in Alaska. The Fisheries Entry Commission evolved after years of controversy regarding access to the fisheries. The State of Alaska first attempted to limit the number of fishermen in 1967. The program was declared unconstitutional by the Alaska Attorney General. In 1968, a limited entry regulation was proposed by the State Boards of Fish and Game and supported by legislation. In 1971 both the regulations and the State law were found by Alaska Superior Court to violate parts of both the U.S. Constitution and the Alaska State Constitution. A constitutional amendment was approved by the voters of Alaska on August 22, 1972. The amendment gave the State the power to implement a limited entry program.

Alaska's current limited entry program became effective on April 27, 1973. In 1975 the Commission regulated entry for the first time into 18 commercial salmon net fisheries and the power troll fishery. According to the Commercial Fisheries Entry Commission's 1975 Annual Report, access to the 19 salmon fisheries put under limited entry is regulated through the issuance of entry permits, each of which enables a person to operate a unit of gear in a particular fishery. Permits are issued on the basis of an applicant's past participation and economic dependence in the fishery for which he is applying. Permits are freely transferable so that access to a fishery is not blocked. The level of effort remains the same, since one person must leave the fishery to every person who enters. Permits may be transferred for a price.

The Commission conducted a permit price survey on permit sales through August 1975. The survey indicated that while specific prices covered a somewhat wider range, the average price paid for an entry permit varied from $750 for a gillnet fishery permit to $11,035 for a purse seine fishery permit. The survey also determined that in the majority of cases where financing is necessary, permit sales are financed by the transferor of the permit, or a bank. Of the respondents, 7.5 percent indicated that a processor had financed the purchase.

According to the Commission's report, the transition from an open access fishery to one with regulated access has generally been smooth, although it has been met with opposition from some quarters. A lawsuit has been filed challenging the constitutionality of the State law regulating entry into commercial fisheries. Also, an initiative petition drive succeeded in gaining enough signatures to put the question of repealing that State statute onto the November 1976 general election ballot.

The commission reported that the effect of reduced gear levels in 1975 compared to 1974 was varied. In most cases, it resulted in additional fishing periods for the fishermen, although the amount of additional fishing time varied according to the strength of the salmon runs. The greatest effect was probably in the southeast Alaska salmon fisheries, where the majority of Washington State fishermen affected by the Judge Boldt decision would otherwise have fished.

During 1975 the Commission began determining the "optimum" number of entry permits for each of the 19 salmon fisheries operating under the entry regulation system that year. Establishing an "optimum number" is necessary in order to identify those fisheries that will require a "buyback" program. The law provides that in any fishery where the optimum

number of entry permits is less than the number of entry permits in the fishery, a voluntary buyback program for the fishery will be instituted by the Commission. Under the program, the Commission would enter the market for permits, and vessels and gear where necessary, as another buyer. Separate programs are to be set up for each fishery requiring buyback and each program is to be funded by the permit holders in the fishery for which it is established. Funding is to come from an annual assessment of up to seven percent on the gross catch of the individual permit holders.

Salmon in Washington

In the State of Washington, the Department of Fisheries manages the salmon resource. An objective of the Department is to achieve optimum harvest of the salmon without impairing their reproductive capacity or endangering the State's overall resource. The Department manages the harvest to insure fair distribution among three user groups: licensed commercial fishermen, treaty right (Indian) fishermen, and personal-use sports fishermen. The Fisheries Department is also engaged in issuing licenses and enforcing fishing laws and regulations. The Washington Department of Fisheries also comanages salmon in certain State waters. The Columbia River Pact is an agreement between Washington and Oregon for regulating, preserving, and protecting fish in the Columbia River.

In 1974 the State of Washington enacted limited entry, in the form of a moratorium, on new licenses for the salmon fisheries between May 6, 1974, and January 1, 1977. This period was designed to allow the State and the industry "to evaluate the moratorium and recommend to the legislature before January 1, 1977, a phase II approach to limit gear entry into the State's commercial salmon fisheries.

Indian treaty fishing rights

Through recent Federal court decisions, the States of Washington and Oregon and the Indian treaty tribes have been called upon to comanage the salmon resource they share. The question of off-reservation fishing rights of Treaty Indians in the Pacific Northwest and the degree to which those rights may be regulated by the State governments have been matters of continuing controversy for many years.

Off-reservation fishing rights of Indians are based on a series of treaties negotiated between the U.S. Government and Indian tribes in the mid-1850s. These treaties provided,

in language similar to the following from the Medicine Creek Treaty, that:

> "The right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians, in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing * * *." (10 Stat. 1132)

Court decisions have held that these rights became the supreme law of the land protected by article six of the Constitution, and they could not be interferred with by the States. Thus, treaty Indians had a different status than non-Indians whose fishing activities are subject to whatever policies or restrictions the States impose.

Furthermore, the Indian treaties were not a grant of rights to the Indians, but rather a grant of rights from them to the non-Indians, with the Indians reserving to themselves those rights not granted. The treaties specifically protect those reserved rights. These basic principles of Federal law, which undergird the decisions in Indian treaty rights cases, have been the subject of much misunderstanding and some have found them difficult to accept. A major development in this longstanding dispute was the landmark decision of the U.S. District Judge George H. Boldt in the case of United States v. Washington, 384 Fed. Supp. 312 (W.D. Wash, 1974) affd, 520 F 2d 676 (9th Cir, 1975) decided in Tacoma, Washington, on February 12, 1974. On June 4, 1975, the U.S. Ninth Circuit Court of Appeals affirmed Judge Boldt's decision in U.S. v. Washington; rehearing denied July 23, 1975. On January 26, 1976, the U.S. Supreme Court denied to review U.S. v. Washington thereby affirming Judge Boldt's decision and the ruling of the U.S. Ninth Circuit Court of Appeals.

The suit was filed against the State of Washington on September 18, 1970, in the U.S. District Court, by the U.S. Department of Justice at the request of the U.S. Department of the Interior, acting on behalf of the United States and as trustee for several Indian tribes.

The area covered by the case is that portion of the State of Washington west of the Cascade Mountains and north of the Columbia River drainage area, and includes the U.S. portion of the Puget Sound watershed, the watersheds of the Olypmic Peninsula north of Grays Harbor watershed, and the off-shore waters adjacent to those areas.

A basic issue in United States v. Washington involved the degree to which the State could regulate and restrict the off-reservation fishing rights of the treaty Indians and whether existing State laws and regulations were discriminatory against the Indians. The question of onreservation fishing was not an issue in the lawsuit, all parties conceding that Indians have an exclusive right to fish within their reservations.

Judge Boldt held that the treaty right extended to "all usual and accustomed grounds and stations," which he defined as "* * * every fishing location where members of a tribe customarily fished from time to time at and before treaty times, however distant from the then usual habitat of the tribe, and whether or not other tribes then fished in the same waters." He said, however, that the term did not include places "used infrequently or at long intervals and extraordinary occasions."

The treaties secured to the Indians the right to fish "in common" with non-Indians. This means that neither group of fishermen is the same. The State and many non-Indians have argued that this provision of the treaty means that each Indian is to have access to the fishing grounds on the same footing as each settler--that the State can impose on each individual Indian the same restrictions it imposes on each individual non-Indian. But the Ninth Circuit Court of Appeals said "The Supreme Court long ago considered this construction * * * and rejected it."

Judge Boldt held that "in common with" means sharing equally the opportunity to take fish that would normally reach the off-reservation usual Indian fishing places. Thus each party--the Indians on the one hand and the non-Indians on the other--is entitled to the opportunity to harvest up to 50 percent of the harvestable numbers of such fish.

The allocation formula has been one of the most widely discussed provisions of the Court's decision. Several features of it should be noted. First, the Court strictly limited the fishing right to those fish not needed for maintaining the runs. "Harvestable fish" are only those above the numbers needed to assure adequate spawning. Second, the fish to be shared include fish that would reach the Indian usual fishing grounds if they had not been caught previously by fishermen who are subject to State control. This includes some of the fish taken in the ocean fisheries by Washington-based fishermen as well as those taken in the State's inland marine waters located ahead of the Indian fishing areas. Third, because of the "special treaty significance" to Indians of fish for

traditional Indian religious and other ceremonies and personal subsistence, the Court excluded fish actually used for those purposes from the sharing formula. It also excluded fish taken on the reservations, since the treaties reserved these areas exclusively for the Indians.

In August 1975 U.S. District Court Judge Robert Belloni issued a supplemental order in the case of United States v. Oregon, calling for the States of Washington and Oregon, with the cooperation of the tribes, to promulgate comprehensive rules to assure the treaty tribes an opportunity to take up to 50 percent of the harvest of Columbia River fall chinook salmon destined to reach the Indians' fishing ground, when the States permit to be taken by all. Together, the Boldt and Belloni decisions cover the major salmon runs of Washington and Oregon and principally affect who catches the salmon resources, Indian or non-Indian fishermen.

International management controls

In addition to State controls, salmon are subject to some international agreements. The International Pacific Salmon Fisheries Commission calls for the conservation and rehabilitation of sockeye and pink salmon occurring in the Frazer River of Canada and adjacent waters. For these two species, the convention goes beyond a strictly management function to provide for an equal division of the catch between the United States and Canada. The International North Pacific Fisheries Commission includes the United States, Canada, and Japan. The Commission has the responsibility to study fish stocks, recommend joint conservation action, and administer absention from any stocks intensively exploited in the North Pacific Ocean. The Commission limits the Japanese take of North American salmon.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

According to NMFS, available Pacific salmon resources are, for all practical purposes, fully utilized. However, several opportunities exist to increase salmon resources through various enhancement, aquaculture, and rehabilitation programs.

The Pacific salmon resource can be increased by constructing hatchery systems to incubate, hatch, and grow young salmon. Along the Pacific coast, over 100 salmon hatcheries are operating and several more are planned, especially in

the State of Alaska. Recent advances in technology for salmon aquaculture and removal of legal barriers to private ownership of salmon have combined with a scarcity of wild stocks to stimulate private investment in ocean farming of Pacific salmon.

According to NMFS, ocean farming is a form of aquaculture in which young salmon are artificially propagated and then released into the ocean to feed and grow. Upon return to their originating river, the mature salmon are harvested. Some ocean farmers rear salmon in salt water pens to a harvestable size to be sold commercially.

Rehabilitation of the salmon fisheries is a long-term program to add to the fishery by reestablishing or increasing natural salmon runs. According to a 1974 salmon industry study, maintaining, protecting, and improving the present freshwater habitat of the salmon will provide for increased salmon production. This can be done by improving spawning grounds, facilitating passage over dams and other obstacles to migration, prohibiting construction of hydroelectric projects, defraying or eliminating industrial practices which adversely affect the freshwater environment, and operating hatcheries and sustaining or improving the runs.

Harvesting capability

According to NMFS, the U.S. salmon industry's harvesting capability is more than adequate to harvest the available salmon resource.

Although harvest capability is adequate, Washington State fisheries officials believe that effective fishery systems should salvage at least one-quarter of a million or more chinook males that are now wasted. Restrictive regulation has prevented progressive development of selective fishing gear to take advantage of such opportunities.

Another opportunity for more effective harvesting is the development of a more accurate system to predict the size of salmon runs. Inaccurate forecasts can result in too many or too few fish reaching the spawning grounds.

Product development and processing

According to industry officials, salmon products are widely accepted throughout the United States and processors have not found expansion to other product forms necessary.

Marketing potential

According to an industry and a Washington State Fishery official, the salmon market has been strong and is expected to continue. The fishery has demonstrated its ability to market unexpectedly large catches which have occurred periodically.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

An independent analysis of Alaska's salmon fishery prepared for the Alaska Department of Fish and Game in 1975 showed that the causes for the overall decline in salmon abundance vary from one area to another. Some of the major reasons given for the decline are: overfishing, management, habitat degeneration, adverse climatic conditions, and foreign fishing.

One of the most important causes in the decline of salmon is that too many fish have been caught. When this occurs, it does not allow sufficient numbers of fish to escape for spawning. Salmon resources are difficult to manage effectively, especially in Alaska with a multitude of salmon streams and small human population.

Habitat degeneration covers many human actions and natural occurrences that result in losses to the habitat needed by the salmon. The more frequently identified causes of habitat loss or damage are: hydroelectric projects, logging, mining, wind storms, floods, earthquakes, and sand and gravel removal. These problems among others will hinder future salmon resource availability.

Adverse weather conditions can also cause declines in the salmon resource. The most common conditions that cause loss of eggs or increased mortality among salmon fry are extremely low temperatures, reduction of water supply due to unusual freezing, and silt or washout resulting from flood conditions. The poor runs of adult salmon in Alaska in 1973, 1974, and 1975 are believed to have been in part due to the unusually cold winters in the early 1970s. Severe winters and changes in sea-surface temperatures could have an accumulative effect upon future Alaska salmon populations.

According to the Alaska salmon study, Japanese high seas fishing has not been an important factor in the overall decline of Pacific Northwest salmon. The report indicated that

Japan's fishing activities, however, do have a large effect on the Bristol Bay sockeye salmon of Alaska. The estimated average annual catch is about 2.5 million salmon. Any further limitations in salmon landings by Japan could provide an increase to the U.S. fishermen in Bristol Bay.

Harvesting capability

Although harvesting capability is adequate, restrictive harvesting regulations are prevalent throughout the salmon industry. For example, the State of Alaska prohibits the use of a drum seine or net reel. Seine vessels cannot be more than 50 feet registered length, monofilament gillnets cannot be used, and a troller cannot have more than four lines. Also, in some districts the length of gillnets is restricted and in other districts the use of seines is prohibited. Limitations on fishing time and fishing areas are widespread. According to NMFS, the above regulations restrict economic efficiency in the Alaska salmon fisheries.

In California, only troll lines are permitted. Oregon allows troll lines and drift gillnets. Washington limits the size of gillnets and purse seines, limits the number of troll lines, prohibits the use of monofilament gillnets, and prohibits and restricts many other devices. The States also require minimum net mesh sizes for conservation purposes. In these States, seasons are limited and fishing within season is limited by weekly closures in many areas. According to NMFS, these regulations and limitations restrain economic efficiency and cause underutilization of gear.

Product development and processing

Industry representatives told us that no major obstacles exist in the Pacific salmon industry concerning product development and processing.

Market development

Salmon industry officials said that strong domestic and foreign markets exist for all forms of salmon products. One official indicated that the availability of supply was the major obstacle in developing new markets.

Management controls

Several entities are involved with managing the U.S. salmon resource. No single entity, however, has complete control over the salmon resource throughout its entire migratory range.

According to the 1975 Alaska salmon study, several problems are associated with managing the salmon fishery in Alaska. Some of these problems include no precise information about stock population, probable return timing and spawning destination, the large size of the State, the multitude of salmon streams, and the financial and manpower needs of the State being out of balance with the resources to be managed. According to an NMFS official in Alaska, other problems affecting Alaska fisheries are: The existence of an overcapitalized fleet, user group pressure for more fish, and Japanese fishing of Bristol Bay sockeye salmon.

According to a Washington State Fishery official, some of the problems concerning fisheries management in Washington are: an overcapitalized fishing fleet; continued user group pressure for more fish; uncontrolled transfer of catch from one fishery or fishing group to another; and regulating the offshore troll fisheries.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

According to a 1971 NMFS report on the ocean distribution of salmon, all major North American salmon stocks are also present outside a 200-mile line in the Gulf of Alaska. However, the present Japanese catch of U.S. salmon is limited by International North Pacific Fisheries Commission. Under the Commission, the Japanese salmon fleet is prohibited from fishing for salmon east of the provisional abstention line at 175° west longitude. The NMFS report states that this abstention line provides practically 100-percent protection from Japanese high seas fishing for all North American salmon stocks except for the Alaska sockeye salmon and possibly the chinook salmon originating in western Alaska.

The Fishery Conservation and Management Act of 1976, which extends the U.S. jurisdiction over fisheries resources to 200 miles, calls for a renegotiation of all international agreements and treaties to make them conform to the act. It is unknown at this time how renegotiation will affect the provisional abstention line, but nevertheless the act provides for exclusive U.S. management authority over all anadromous species such as salmon throughout the migratory range of the species beyond the conservation zone. An exception to this policy occurs when such species are found within any foreign nation's territorial sea or fishery conservation zone recognized by the United States. Therefore, U.S. salmon stocks should remain under the management control of the United States, with or without the abstention line, if the United States enforces provisions of the Fishery Conservation and Management Act of 1976.

SCALLOPS

There are three types of scallops harvested commercially in the U.S.: sea, bay, and calico. The sea scallop is the most important fishery, accounting for 74.4 percent of the total 1975 scallop landings and 80.6 percent of the value, using exvessel prices. Sea scallops are mollusk shellfish usually found on gravel beds, sand, or pebbles mixed with shells. Adult scallops are basically sedentary bottom dwellers, though they can swim short distances by flexing their shells together. While individuals are mobile, tagging experiments indicate that populations do not migrate. Sea scallops have a saucer-shaped shell and grow as large as 8 inches in diameter.

Sea scallops are found primarily along the Continental Shelf from the Strait of Belle Isle, Newfoundland, Canada to the mouth of Chesapeake Bay. Georges Bank, located off the coast of New England (see fig. 1), has been the major production area, accounting for about two-thirds of U.S. sea scallop landings in the past 3 decades. Massachusetts is the leading State in the sea scallop fishery with over half of the recorded landings and value in 1975. The sea scallop fishery in 1973 ranked ninth in value among U.S. Atlantic coast fisheries. In addition to the Atlantic fishery, there is a small sea scallop fishery off the coast of Alaska.

Bay scallops are less plentiful. They are found mainly in grassy bottoms of shallow bays and estuaries from Cape Cod, Massachusetts to the Gulf of Mexico in 1- to 50-foot depths. Their maximum size is about three inches in diameter. The calico scallop is located along the Atlantic coast, from slightly north of Cape Hatteras, North Carolina to Florida and along the coast throughout the Gulf of Mexico. It is closely related to the bay scallop although slightly larger and acquires the name "calico" from the mottled or calico appearance of the shells.

STATUS OF THE FISHERIES

Current harvest

U.S. landings of scallops, as shown in figure 2, have followed a declining trend in the last decade. In 1975, however, due to increased abundance in some areas, landings of sea scallops increased to 9.7 million pounds, from 6.5 million pounds in 1974. The overall declining trend in sea scallop landings was caused by a combination of factors including reduced resource abundance and increased competition from foreign imports. NMFS officials cited overfishing

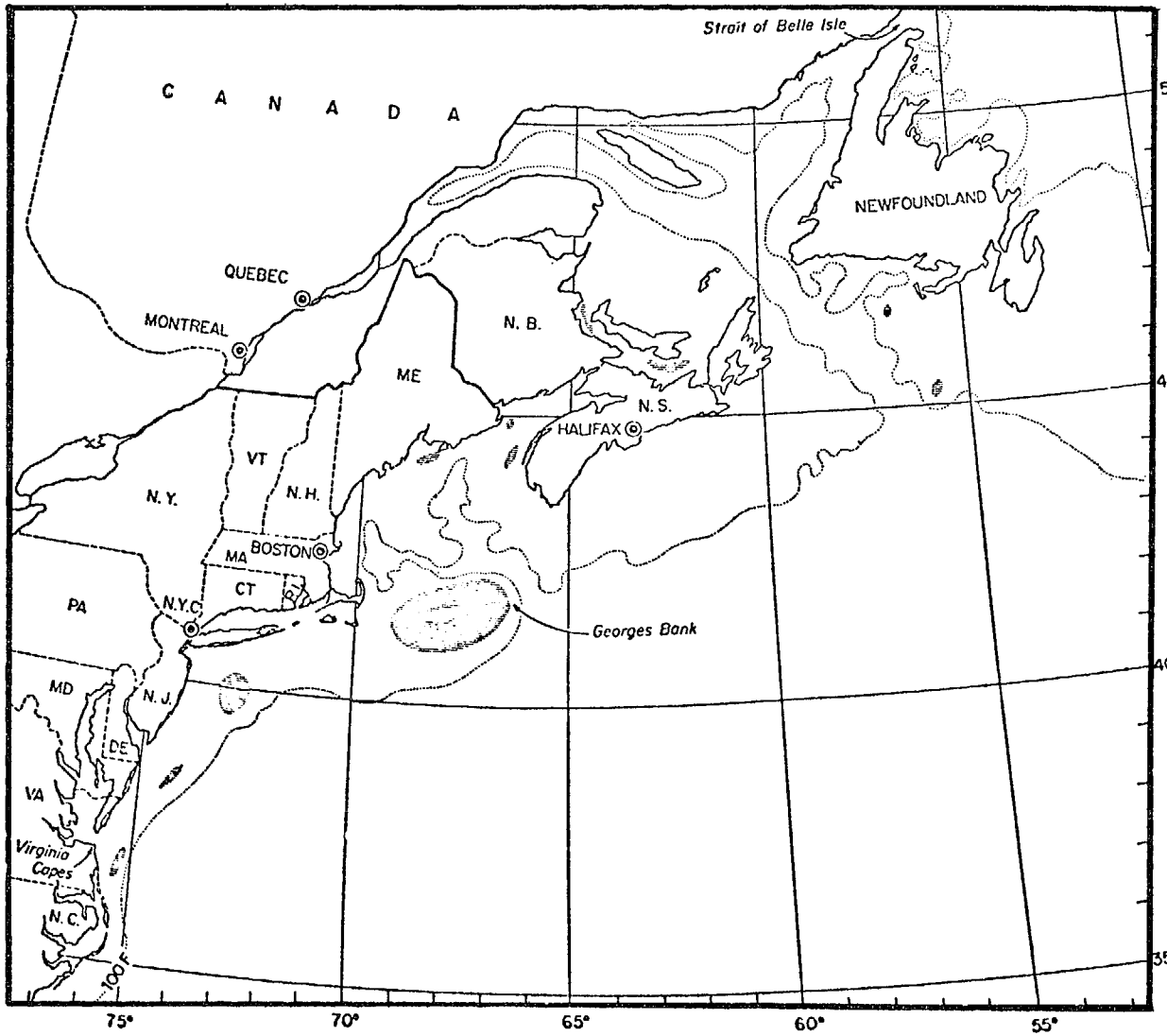

FIGURE 1. MAJOR SEA SCALLOP FISHING GROUNDS OF THE NORTHWEST ATLANTIC

APPENDIX III

APPENDIX III

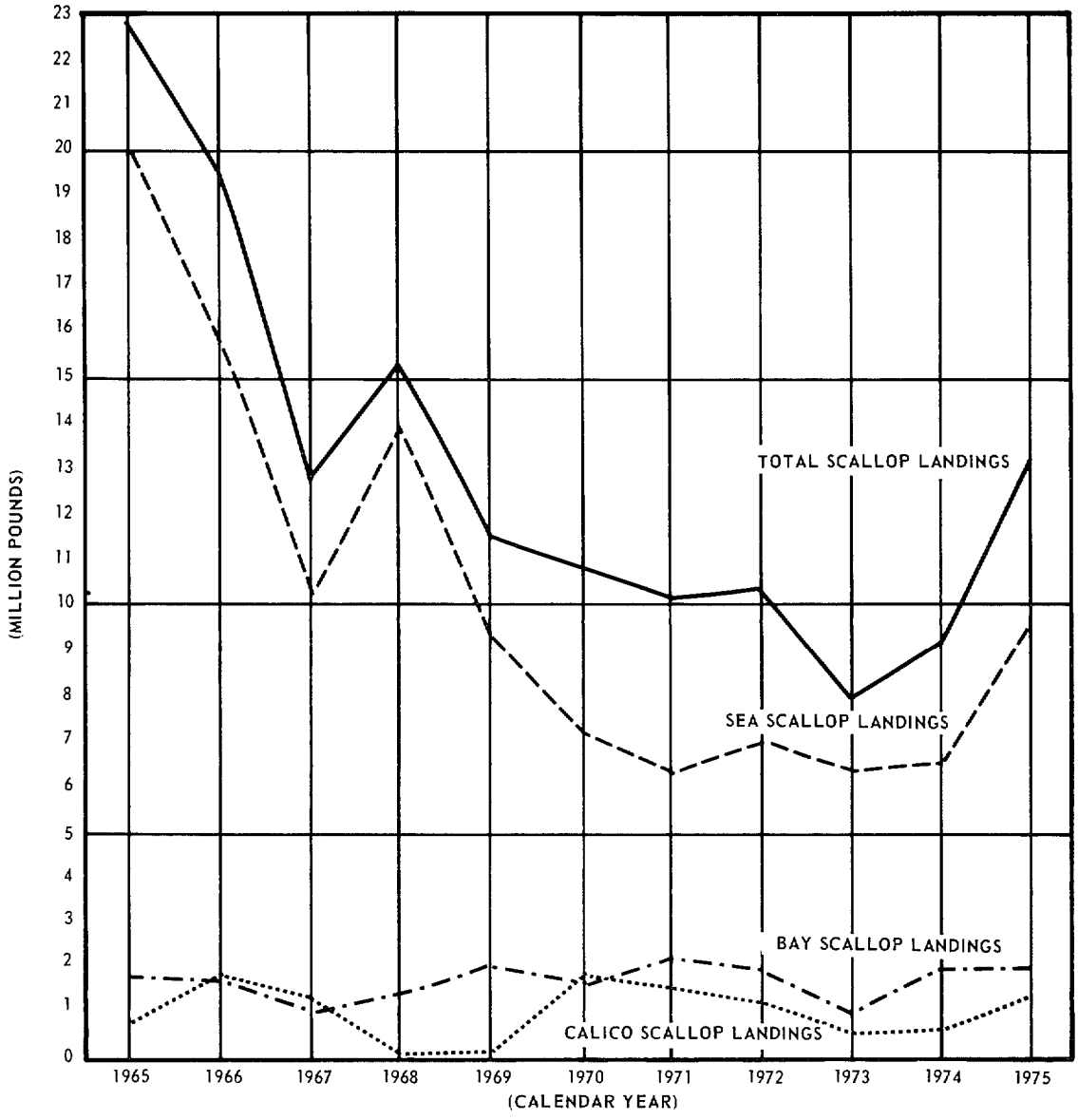

FIGURE 2. SCALLOP LANDINGS

of the resource, primarily by Canadian fishermen, as an important factor in the decline in resource abundance.

Since 1969 imports, coming mostly from Canada, have exceeded domestic scallop production. U.S. fishermen relate extensive Canadian Government subsidization of the fishing industry to the favorable position that its fishermen have been able to develop in the scallop fishery. For example, the Canadian Government will pay 35 percent of the approved cost of eligible fishing vessels. With reduced abundance and increased foreign competition, many U.S. scallop fishermen transferred their operations to other fisheries.

Table 1 shows the distribution of 1975 landings, based on preliminary data, by State. Most sea scallops are harvested beyond the 3-mile territorial limit. Preliminary data for 1975 showed that 83 percent of the sea scallops were caught more than 3 miles off the U.S. coast. Calico scallops are harvested beyond the 3-mile limit, while bay scallops are harvested entirely within the 3-mile limit under jurisdiction of individual States.

TABLE 1

1975 SCALLOP LANDINGS BY STATE (note a)
(Meat weight)

	Sea Scallop		Bay Scallop		Calico Scallop		Total		Percent of
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Value
	(000 omitted)								
Massachusetts	5,383	$10,166	1,350	$2,700	-	-	6,733	$12,866	57.6
Maine	1,594	3,019	-	-	-	-	1,594	3,019	13.5
Rhode Island	104	194	-	-	-	-	104	194	.9
New York	270	389	444	713	-	-	714	1,102	4.9
New Jersey	711	1,391	-	-	-	-	711	1,391	6.2
Maryland	4	6	-	-	-	-	4	6	-
Virginia	1,266	2,324	-	-	-	-	1,266	2,324	10.4
North Carolina	-	-	139	111	-	-	139	111	.5
Florida	-	-	15	11	1,400	812	1,415	823	3.7
Washington	-	-	1	N/A	-	-	1	N/A	-
Alaska	403	520	-	-	-	-	403	520	2.3
Total	9,735	$18,009	1,949	$3,535	1,400	$812	13,084	$22,356	100
Percent	74.4	80.6	14.9	15.8	10.7	3.6	100	100	

[a]Preliminary data.
N/A--Not Available.

Fishing fleet

Vessels used in harvesting sea scallops are mostly small draggers between 50 and 200 gross tons. The scallops are harvested by using a dredge consisting of a heavy metal frame mounted on runners and a bag of steel rings. There is no standard design for a dredge; each fishermen modifies the basic design. The dredge shown in the photograph on page 225 is typical of an off-shore sea scallop dredge. The basic dredge design, although old, is considered fairly efficient.

APPENDIX III

SEA SCALLOP DREDGE

Many of the vessels can quickly be converted between trawling for groundfish and scalloping to accommodate changing fishing and marketing conditions. In recent years, with declining stocks and increased foreign competition, many of the U.S. scallopers have transferred their operations to groundfishing. The total number of vessels fishing for sea scallops as shown in table 2 greatly declined. However, total U.S. and Canadian fishing effort is approximately the same as in the early 1960s. The number of boats (under 5 tons), mostly fishing out of Maine ports, has greatly increased. In 1966, 36 boats harvested sea scallops, while in 1972, there were 174 boats in the fishery. Detailed evaluations of the fleet's condition were not available; however, industry and NMFS officials consider the sea scallop fleet to be in generally good condition.

TABLE 2

NUMBER OF VESSELS HARVESTING ATLANTIC SEA SCALLOPS

Year	Number of Vessels
1958	164
1959	160
1960	155
1961	133
1962	121
1963	95
1964	93
1965	155
1966	123
1967	117
1968	170
1969	149
1970	82
1971	76
1972	90

Products and processing

Processing of most sea scallops begins at sea right after the dredge is hauled up and the contents emptied on deck. The sweet flavored muscle, referred to as the "eye," is removed (manually shucked) from the shell. The rest of the scallop is discarded overboard. Meats are washed in sea water, packed in new clean muslin bags holding about 40 pounds, and stored under ice. Since scallops die shortly after being taken from the water, they are shucked aboard ship. Plant processing of scallops consists of rewashing

the meats, and boxing for fresh and frozen markets. The bulk of the shucked scallop meat is sold either fresh or frozen without further processing; however, an increasing percent is processed into precooked convenience foods frozen for retail sale.

Markets

Scallops are a highly desired seafood item. Demand for this product is strong and, accordingly, exvessel prices have generally followed an increasing trend, as shown in table 3.

Available supplies, as noted in table 4, by combined domestic landings and imports, show a decline from the mid 1960s, a leveling off in the late 1960s and early 1970s,

TABLE 3

EXVESSEL SCALLOP PRICES

Year	Exvessel price per pound
1960	$ .35
1961	.38
1962	.41
1963	.46
1964	.55
1965	.66
1966	.48
1967	.76
1968	1.08
1969	1.04
1970	1.28
1971	1.41
1972	1.83
1973	1.69
1974	1.52
1975	1.85

and an increase in 1975. During the last two decades the import share of the domestic market has increased rapidly. In 1960, the import share of available scallop supplies was only 19 percent. Since 1970, the import share has ranged from 60 to 71 percent. Most of the scallop imports are obtained from Canada, but substantial quantities are also obtained from Iceland and the United Kingdom. The United States does not export scallops.

APPENDIX III

TABLE 4

SCALLOP SUPPLY BY YEAR

Year	Imports		U.S. Landings		Total Supply		Import Share of Total Supply (note a)
	Pounds	Value	Pounds	Value	Pounds	Value	
	(000 omitted)						
1965	16,495	10,643	22,801	14,976	39,296	25,619	42
1966	16,712	8,375	19,612	9,666	36,324	18,041	46
1967	13,461	9,314	12,750	9,137	26,211	18,451	51
1968	14,581	15,709	15,398	16,711	29,979	32,420	49
1969	14,322	14,654	11,625	12,252	25,947	26,906	55
1970	16,830	19,666	10,837	12,403	27,667	32,069	61
1971	17,389	21,932	10,226	13,629	27,615	35,561	63
1972	20,820	36,194	10,401	17,489	31,221	53,683	67
1973	19,833	33,625	7,972	13,198	27,805	46,823	71
1974(note b)	18,100	28,106	9,200	13,417	27,300	41,523	66
1975(note b)	19,737	37,183	13,084	22,356	32,821	59,539	60

[a]Expressed in percent.

[b]Preliminary data.

Employment

As the number of vessels declined, the number of fishermen onboard also declined. In 1966, there were 1,356 fishermen on Atlantic sea scallop vessels. By 1972, the number had declined to 731. The number of fishermen on sea scallop boats and on shore, however, including casual fishermen, increased from 59 in 1966 to 294 in 1972. Since scallops are processed in some plants that process other species, there is no specific employment data available to identify the number of employees processing scallops.

Recreational fishing

Recreational fishing is a minor activity, and has little effect on the commercial harvest of sea scallops.

Management control

Within the 3-mile territorial limit, States have jurisdiction authority over scallops. Although several States have sea scallop regulations, given the limited availability in inshore waters except in Maine, these regulations have little effect on the fishery. The State of Maine, which accounted for 95 percent of the sea scallop landings inside the 3-mile limit in 1975, has several scallop regulations including a closed season in some areas, licensing requirements, and a minimum size limit.

No U.S. regulations exist for sea scallops beyond the 3-mile limit where most are caught. Attempts to introduce scallop regulations through the International Commission for Northwest Atlantic Fisheries (ICNAF) have not yet been successful. In 1972 ICNAF passed a resolution recommending the adoption of sea scallop regulations providing for a minimum harvestable shell size of 95 millimeters (3.8 inches) and an average count of scallop meats of forty units or less per pound. Canada objected to the regulations and filed a reservation followed by the United States, thus not binding either government to the ICNAF recommendation. Canada's objection, according to an NMFS official, was based on the immediate adverse effect that the regulations would have on the Canadian scallop fishermen. The United States filed its

reservation after Canada, because of the unfairness that would result if only U.S. fishermen had to comply.

The Canadian Government has adopted less stringent measures and is expected to gradually attain the recommended regulations. NMFS officials stated that the regulations would have had only minimal effect on the U.S. fishermen because they generally harvest larger scallops. As of July 1976, however, U.S. officials, with domestic industry support, were planning to withdraw the reservation by the United States and begin implementing the sea scallop regulations recommended by ICNAF.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT

Resource availability

No maximum sustainable yield (MSY) figure is available for sea scallops. Due to its nature, though, the MSY concept may not be applicable to the sea scallop resource. With existing information, however, NMFS biologists have concluded that overall sea scallop abundance is considerably lower than in the 1960s and that the yield would be increased by postponing the age of first capture by several more years. For example, NMFS surveys in 1975 found a important set of young scallops south of Long Island and east of Sandy Hook, New Jersey in the Middle Atlantic Bight, and on the Northern Edge and Peak on Georges Bank. NMFS biologists believe these scallops should not be harvested for at least two more years to obtain higher meat yield. An NMFS biologist estimated that the average annual yield for the sea scallop on Georges Bank, the most productive sea scallop area, may be about 20 million pounds, provided stocks are allowed to rebuild and fishing effort is controlled at reasonable levels.

The status of the Alaska sea scallop is not clear but it appears that catches may not increase much above present landings of under 2 million pounds per year. Bay scallop landings have generally ranged between 1 and 2 million pounds annually; large increases beyond this level are not expected. Calico scallops are considered an underutilized resource. Although no MSY has been established, an NMFS official estimates that it is probably many times the annual landings rate which has fluctuated widely, up to 1.9 million pounds in 1966.

Harvesting capability

If the abundance of sea scallops increased dramatically, the scallop fleet could be expanded rapidly, because many

vessels in the U.S. groundfish fleet can easily be converted to scallop fishing.

Product development and processing

With current market acceptance, there is little need to develop new product forms. Processing of sea scallops is relatively simple and current processing methods appear to be efficient.

Marketing potential

Scallops are a highly desired food item and enjoy a favorable marketing position capable of absorbing increased supplies.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT

Resource availability and management control

Lack of information has been an obstacle limiting full determination of the availability of scallop resources. A new stock assessment is needed, particularly in relation to estimating the current population sizes and recruitment. While more data is needed, there is adequate information to initiate management regulations. On the basis of available data, NMFS officials believe that the Georges Bank resource is being overfished, primarily by Canadian fishermen. Many scallops, they explained, are harvested at sizes much smaller than the size producing maximum yield. NMFS officials have also noted small sea scallops being harvested in Middle Atlantic scallop beds by U.S. fishermen. Adoption of proposed sea scallop size regulations, as noted previously, would help to increase availability of this resource.

Harvesting capability

Although the exvessel price of scallops has been relatively high, reduced overall resource abundance and strong foreign competition limit opportunities for increasing the fleet size. Industry officials cited other general problems affecting the scallop fishery, such as import duties on foreign electronic fishing gear and high protection and indemnity insurance premiums because of the Jones Act (46 U.S.C. 688).

Product development and processing

Processors of sea scallops indicated that their only obstacle to plant and product expansion is the limited supply of the resource.

Market development

Resource availability is the main deterrent to market expansion.

EFFECTS OF A 200-MILE LIMIT

More effective management is needed to assure improved and continued resource availability to U.S. fishermen. The Fishery Conservation and Management Act of 1976 provides an opportunity for improved sea scallop management through extension of U.S. jurisdiction over fisheries resources to 200 miles off coasts and by creation of the Regional Fishery Management Councils. There is, however, still a potential jurisdiction problem related to control of Georges Bank. Establishment of boundaries based on equidistant lines between the Canadian and U.S. coasts would result in Canadian control of the northeast portion of this area. U.S. officials contend that Georges Bank is an extension of the U.S. Continental Shelf and therefore should be under U.S. control. Since highly productive scallop grounds are located in the disputed area, many U.S. fishermen consider it important to their financial stability.

SHRIMP

Shrimp is the most valuable fishery in the United States. Landings of 343.6 million pounds in 1975 were worth $226.2 million to fishermen. In 1975, the United States imported 201.5 million pounds of shrimp products worth $346.2 million. In the same year, domestic exports amounted to 34.3 million pounds worth $64.3 million.

Viability of the fishery is threatened by stock depletion in some areas, inadequate management data, environmental deterioration, and excess harvesting capacity. On the other hand, the development of underutilized species, management program improvements, cost reductions, and limited entry into the harvesting segment of the fishery provide opportunities to improve the U.S. shrimp fishery.

STATUS OF THE FISHERY

Current harvest

In 1975, Alaska led the Nation in volume of shrimp caught; however, Texas was the leading State in value, with landings worth $87.9 million.

The Gulf States in 1975 accounted for 79 percent of the value of the shrimp harvest by landing 49 percent of the total U.S. catch. Although Pacific coast landings have increased, the value of Gulf shrimp landings continues to exceed the value of landings from all other regions. Historically, the Gulf has provided over 76 percent of the landed value of U.S. shrimp.

Gulf of Mexico

In the Gulf fishery, only three species of the family Penaeidae are caught in large numbers--the brown shrimp, the white shrimp, and the pink shrimp. Also fished are the seabob and the royal red shrimp. These shrimp are caught off the coasts of Louisiana, Texas, Florida, Alabama, Mississippi, and Mexico. Most Penaeid shrimp are caught in depths of 50 fathoms or less and their life history is tied to estuaries. Panaeids spawn off shore and probably do not live much more than two years; the average life span is thought to be about 18 months. The fertilized eggs develop rapidly into larvae and juveniles that are carried by currents shoreward into extensive shallow estuaries where the shrimp grow rapidly for 2 or 3 months. As they near maturity, they leave these grounds and return offshore to complete the life cycle. Gulf shrimp are considered to be an annual crop.

The greatest portion of Gulf shrimp are harvested by Louisiana and Texas fleets in these States.

State	Gulf of Mexico shrimp landings (note a)			
	1972	1973	1974	1975
	----------000 omitted----------			
Florida, west coast	22,828	26,137	28,462	28,168
Alabama	17,549	12,019	13,922	14,056
Mississippi	7,951	3,681	5,316	4,044
Louisiana	83,032	58,648	59,581	53,134
Texas	97,578	81,720	78,677	70,509
Total	228,938	182,205	185,958	169,911

a/Expressed in pounds.

Shrimp taken in waters off Mexico and landed in the United States accounted for about 11 percent of the value of landings in 1974.

The shrimp fishery continues to be the most important fishery in the Gulf of Mexico in terms of value, while being second to menhaden in volume.

Estimates of recent year catches by U.S. flag vessels in other countries, mostly in Central and South America, are in the area of 14 million pounds annually worth about $18 million and average about 70,000 pounds per boat.

Cuban and Mexican vessels trawl in the Gulf of Mexico off Florida and Texas. The following schedule shows the estimated quantity (pounds) harvested.

Fishing nation	Area fished	1971	1972	1973	1974	1975
Cuba	off Florida	57,440	10,240	20,480	75,000	135,000
Mexico	off Florida	-	-	-	-	105,000
Mexico	off Texas	783,000	83,820	-	-	225,000
Cuba	off Texas	-	-	1,710,000	1,110,000	1,665,000

Atlantic coast

The North Atlantic northern shrimp fishery was closed indefinitely on April 15, 1976, by the Atlantic States Marine Fisheries Commission. Stocks had been declining at an alarming rate and landings had dropped sharply since 1972. In 1975, 11.7 million pounds of shrimp worth $3.1 million were landed. Recommendations for 1977, if any, will be made to the Commission after a review of the fishery during the fall of 1976.

The northern shrimp is found off the coasts of Massachusetts, New Hampshire, and Maine. The species migrates from coastal areas to about 25 miles offshore. In recent years the majority of the catch was made beyond the 3-mile territorial limit under State jurisdiction. Attempts to maintain catch levels in view of declining stock abundance resulted in increased landings of small (male) shrimp. This adversely affected stocks because of the unique biological characteristic of sex transformation from male to female during the shrimp's third year. The life span of the northern shrimp ranges from 4 to 6 years.

The South Atlantic fishery is based on three major species--the pink shrimp, the white shrimp, and the brown shrimp--most of which are caught within 3 miles of the U.S. coast from North Carolina to southern Florida. Also fished are the rock shrimp and the royal red shrimp. White shrimp is the predominant species in terms of commercial harvest. Although most shrimp are caught during their first year, it is estimated they can live up to 2 years.

In 1975 shrimp landings on the South Atlantic coast amounted to 24.9 million pounds worth $30.3 million. The fishery has generally prospered during its 100-year history without stock depletion. The fishery appears to be operating at or near the MSY.

Pacific coast

The Pacific coast fishery is based on species of the family Pandalidae. The northern pink shrimp is of commercial importance in Alaska. The ocean pink shrimp is the principal species of the lower Pacific coast (Washington, Oregon, and California) fishery. Pink shrimp has made up the bulk of the Pacific coast shrimp catch.

In 1975 shrimp landings on the Pacific coast amounted to 136.9 million pounds worth $14.5 million. Alaska was the dominant State with landings of 98.3 million pounds (approximately three-quarters of the total Pacific catch).

Landings in other Pacific States amounted to 24 million pounds in Oregon, 9.7 million pounds in Washington, and 4.9 million pounds in California.

In 1975, for the fourth consecutive year, Alaska led the Nation in volume of shrimp landed. The greatest portion of the Alaskan catch was harvested in Kodiak waters and landed in Kodiak, making it the Pacific coast's number one shrimp port.

In relation to other Pacific coast fisheries, the shrimp fishery was sixth in dollar value in 1972. More current data was not available.

Products and processing

Shrimp are processed into different combinations of the following major categories:

--fresh, frozen, or canned;
--whole, or headless (peeled or unpeeled);
--raw or cooked; and
--breaded.

Specialty (burgers, creoles, cocktails, gumbos, soups, and dips), smoked, sun-dried, scrap, and meal product forms are also produced.

The United States processed 297.6 million pounds of shrimp products in 1972, worth $417.8 million. Raw and breaded shrimp in fresh and frozen forms accounted for the greatest part of the volume and value of total production. Frozen shrimp, most of which goes to institutional markets, dominates sales. As the frozen shrimp market has expanded, fresh shrimp sales have accounted for a smaller share of the total market. As shown below, canned shrimp represented about 8 percent of production.

Item	Percent of U.S. Production--1972	
	Volume	Value
Fresh and frozen:		
Raw	40.6	44.3
Cooked	10.1	9.0
Breaded	36.1	33.7
Specialties	4.4	3.0
	91.2	90.0
Canned:		
Regular	8.0	9.3
Specialty	.1	.4
	8.1	9.7
Other: (Smoked, sun-dried, scrap, and meal)	.7	.3
Total	100.0	100.0

APPENDIX III

Fresh, frozen, and canned products from the Gulf States accounted for about 65 percent of 1972 production in both value and volume.

Item	Percent of U.S. Production--1972					
	Volume			Value		
	Gulf of Mexico		Pacific coast		Atlantic coast	
	Volume	Value	Volume	Value	Volume	Value
Fresh and frozen:						
Raw	37.8	41.3	1.0	0.8	1.5	1.8
Cooked	0.7	1.0	3.4	3.2	5.2	3.6
Breaded	20.7	18.3	3.0	3.6	9.0	8.8
Specialties	0.1	0.1	-	-	1.0	0.6
	59.3	60.7	7.4	7.6	16.7	14.8
Canned	5.0	7.0	3.0	2.3	-	-
Total	64.3	67.7	10.4	9.9	16.7	14.8

Note: These production figures do not account for total U.S. production because inland production and minor product forms are not shown.

Processing may be as simple as beheading (either before or after landing), sorting, and then icing the shrimp; or as complicated as peeling, deveining, cooking, breading, canning, freezing, and sun drying. Procedures may vary from region to region and among processors.

Important advancements have been made in shrimp processing techniques since World War II. Freezer technology improvements led to new shrimp product development and expanded the potential market for shrimp. Mechanical shrimp peelers, introduced from the Gulf to the Pacific coast in 1957, greatly reduced the need for expensive manual labor. By 1974 the mechanical peeler processed the majority of the shrimp on the Pacific coasts including Alaska. Processing firms at major Atlantic shrimp ports are using automatic cleaning, peeling, cooking, and freezing equipment. Shrimp are graded by machine. In the Gulf of Mexico, hand labor is still used to remove heads from shrimp but much of this activity takes place on board the vessel.

APPENDIX III

Markets

Domestic demand for shrimp has been strong; per capita consumption has risen since 1960.

Domestic consumer demand has been much greater than shrimp production in the United States; therefore imports since the 1950s have been of importance to the domestic market. The amount of shrimp products imported in relation to U.S. landings grew significantly from 1954 to 1961. From 1961 to 1974, for every pound of shrimp landed in the United States an additional pound or more was imported (except in 1971).

In 1974 the United States imported a record 228.9 million pounds of shrimp worth $387.3 million. Imports in 1975 amounted to 201.5 million pounds worth $346.2 million.

Shrimp is the major fish product imported with respect to value, accounting for 25 percent of the value of all imported edible fish products in 1975. Mexico supplied 40 percent of the shrimp imports in 1975 with India and Panama being the other principal sources. The United States uses more than 25 percent of the total world shrimp production.

In the Gulf and South Atlantic regions, average ex-vessel prices per pound increased steadily from 1965 through 1972 (except 1967 and 1970), then jumped dramatically in 1973.

Periodically, supply increments exceed consumption by a large margin and this can cause marketing problems. From 1950 through 1968 there were four price breaks in shrimp markets. Each occurred during a slowdown in the national economy.

--1954 - Resulted from increase in domestic landings of record levels.

--1959-60 - Resulted from increased landings augmented by the largest annual increment in imports during the period.

--1963 and 1967 - Resulted from rapidly expanding imports coinciding with high domestic landings, which caused supplies to exceed demands weakened by the business recession.

The substantial wholesale and retail price increases in 1973, was due, principally, to a reduced annual crop--the result of adverse environmental conditions--and increased fuel costs.

The peak of an upward Gulf and South Atlantic demand trend was reached in fall of 1973 during the time of the meat boycott. Consumer demand shifted from meat to other options and shrimp prices increased even faster. But problems developed in 1974 and early 1975 in shrimp marketing.

The gains in 1972 and 1973 particularly brightened the market outlook and suppliers anticipated further increases. The increase in per capita supplies of shrimp in 1972 was double the increase in consumption, resulting in enormous inventory buildups. The carryover into 1973 was a record inventory of 93 million pounds of shrimp.

The large carryover helped sustain consumption during a period when both domestic landings and imports were in short supply. Toward the end of 1973, however, landings and imports improved at a time when demand weakened notably. (Imports reached a record 229 million pounds in 1974.) The severity of the shrimp market led to NMFS establishing an Emergency Marketing Program (EMP) in November 1974. Although the ex-vessel price rebounded in 1975 to record levels, EMP was active through June 1976. In fact, the 1975 recovery had been even more dramatic than the decline.

In 1975 domestic shrimp product exports accounted for about 24 percent of the total value of edible domestic seafood products exported by the United States. In recent years over half of the northern shrimp landings have been exported. Domestic shrimp products worth about $64.3 million (34.3 million pounds) were exported in 1975.

Fishing Fleet

The primary gear in use off the Atlantic, Gulf, and Pacific coasts is the shrimp otter trawl. Beam trawls, pots, butterfly nets, and traps are also used, but they account for only a small portion of the catch.

The U.S. shrimp fleet varies within the Atlantic, gulf, and Pacific regions.

In the North Atlantic, lobster boats and small trawlers seasonally rigged for shrimp trawling constitute the majority of the fleet in terms of numbers of vessels and account for about 40 percent of the total catch. The trend is toward larger vessels, specially designed and equipped for operations farther offshore during the warmer seasons.

In the South Atlantic and the Gulf of Mexico, there are both offshore and inshore fleets. The most common offshore vessels are the "Florida-type" trawlers, constructed of wood, steel, or fiberglass. They are 50 to 85 feet long and are double-rigged for towing two nets simultaneously. The Florida-type vessels have a round bottom, flared bow, and a broad, square transom stern. The deckhouse and engine are forward and the clear fishing deck and fish hold are aft. Typically the vessels are diesel powered. Vessels in the 50-to 70-foot class are generally powered by 100-to 200-horsepower diesels. Most of the vessels are equipped with electronic navigational aids and have the capacity for wide-ranging fishing operations.

The vessels used for inshore shrimping in the Gulf and South Atlantic exploit the bays, estuarine areas, and nearshore areas. There are many small boats of 5 net tons or less--often referred to as the "mosquito fleet"--displaying quite a variety of designs and individual styles of construction. Many of the smaller boats are gasoline powered although there is a trend toward diesel power. These boats are usually rigged for towing a single trawl.

On the Pacific coast, the boats and vessels used to harvest shrimp are also components of the groundfish and crab fleets; only different fishing gear is used. They are extremely varied in description and as such there is no typical shrimp boat or vessel. Most range in length from 65 to 115 feet; the overall range in length is from 30 to 150 feet.

NMFS statistics show that in 1972 6,663 boats and 7,007 vessels participated in the 1972 shrimp harvest.

Boats and vessels in the U.S. Shrimp Fishery--1972

Region	Boats			Vessels		
	Otter trawl	Other gear	Total	Otter trawl	Other gear	Total
North Atlantic	256	61	317	185	-	185
South Atlantic	980	70	1,050	1,394	-	1,394
Gulf of Mexico	4,848	411	5,259	5,134	45	5,179
Pacific	4	33	37	184	65	249
Total	6,088	575	6,663	6,897	110	7,007

APPENDIX III

Employment

Although employment statistics are published as an inventory of personnel employed in the shrimp fishery, the figures do not reflect the numbers of personnel involved exclusively in harvesting shrimp. Many of those reported as shrimp fishermen also harvest crab, groundfish, oysters, or lobster.

The number of fishermen who harvested shrimp in 1972 were:

	Shrimp fishermen		
	On boats		
	Regular	Casual	On vessels
North Atlantic	375	197	550
South Atlantic	519	818	3,031
Gulf of Mexico	4,787	2,343	13,615
Pacific coast	38	19	730
Total	5,719	3,377	17,926

Employment data for the processing and wholesaling segments of the fishery was not available because these industry segments are diversified in terms of the species processed and wholesaled. NMFS personnel do not believe it is possible to identify the number of persons involved in processing or wholesaling the species of a particular fishery.

Recreational Fishing

In 1974 NMFS made a pilot recreational fishing survey in the Northeastern States. This effort was the first part of a national program to annually estimate and report the number of recreational fishermen, their finfish and shellfish catch, and their fishing expenditures.

In the survey of the Northeastern United States the 1974 recreational catch of northern shrimp is reported to have been about 9,000 pounds. According to an NMFS official, minimal catches by North Atlantic recreational fishermen have little effect on the resource.

As another part of the national program, NMFS conducted a survey in 1975 of the Southeastern and Gulf States.

Recreational shrimp fishing in the South Atlantic is estimated to be widespread--about 10 to 15 percent of the total catch of shrimp in the region.

In the Gulf of Mexico, recreational fishermen in some coastal areas harvest large quantities of shrimp. An unpublished 1968 report by the Louisiana Bureau of Sport Fisheries and Wildlife estimated that the Louisiana sport shrimping activity in 1968 involved a catch of 18,650,000 pounds of shrimp. Commercial shrimp landings in Louisiana for that year amounted to about 67,767,800 pounds.

NMFS had planned to survey the Pacific States in 1976 but this part of the program has been delayed. According to Alaska, Washington, and Oregon State officials, little recreational fishing for shrimp exists on the Pacific coast. The only measurable amount, approximately 3,000 pounds in 1975, was caught in the Puget Sound in Washington.

Management Controls

Management of the U.S. shrimp fishery is fragmented. There are no overall management programs for species common to the various States of the South Atlantic, Gulf, and Pacific segments of the fishery. Individual State regulation is the rule. Only the North Atlantic region manages the fishery on a comprehensive basis.

North Atlantic

The northern Atlantic shrimp fishery was completely unregulated until Maine, New Hampshire, and Massachusetts initiated action jointly with NMFS to cooperatively manage the northern shrimp species as part of the State-Federal Fisheries Management Program. In 1973 the three States adopted an interim net mesh size regulation designed to protect small male shrimp and delegated authority to the Atlantic States Marine Fisheries Commission to regulate the fishery. In November 1973 the Commission issued the interim net mesh regulation. Due to limited resources, however, the States did not fully enforce the regulation. A decline in the shrimp population continued and additional conservation measures were needed. In June 1975 the Commission adopted a July 5 to September 27, 1975, fisherywide season closure. Even with this, 1975 landings of 11.7 million pounds were 27 percent more than the 9.2 million pound limit the biologists recommended as the total allowable catch. On April 15, 1976, the Commission closed the northern shrimp fishery indefinitely. Recommendations for the 1977 fishery, if any, will be made to the Commission by the Northern Shrimp Section when they review the fishery during the fall of 1976.

South Atlantic

There is no overall management scheme in effect for those species common to the South Atlantic States. Laws and regulations regarding seasons, gear, areas, and/or the size of shrimp taken vary by State. For example, no minimum shrimp count is specified in the Carolinas while Georgia limits the catch to 45 shrimp (heads on) per pound and Florida allows a count of 70 shrimp per pound (decapitated). In 1973 a cooperative State-Federal management committee was established to examine the feasibility and desirability of managing the shrimp fishery on a regional basis. The shrimp fishery was selected for cooperative management because it was the most valuable fishery in the Southeast region and was evenly distributed among the States.

By May 1975 a proposed comprehensive management plan proposal for the South Atlantic shrimp fishery had been completed. The plan recommends actions to deal with the problems identified during the initial planning phase. A State official believed that implementing recommendations would begin after formal acceptance by the States. As of June 1, 1976, the plan had not been accepted by the States due to uncertainties concerning implementation of the Fishery Conservation and Management Act of 1976.

Gulf of Mexico

There is no overall management program for the Gulf shrimp fishery nor has one been proposed. Like the South Atlantic States, State-to-State variations in laws and regulations exist. Texas limits the catch count to 39 shrimp (heads on) per pound. Louisiana, Mississippi, and Alabama allow a count of 68 per pound, while Florida limits the count to 47 per pound but allows 5 percent of the catch to be greater than 47 count. Two States limit mesh sizes, two do not, and the Florida limit varies on a county-by-county basis.

State agencies usually regulate shrimping in the nursery area (bays and bayous) to insure survival of small shrimp until they are large enough to migrate from the estuarine area. Passage by the United States of the 12-mile contiguous fishing zone in 1966 aids in protecting from foreign fishing fleets that part of the Gulf resource within the 12-mile zone. (About half of the shrimp caught in 1975 by U.S. vessels off the Gulf States were taken in the 12-mile zone).

Pacific coast

The Pacific fishery is under management of the individual States. All the States control the amount of shrimp caught by catch quotas or limited seasons. California, Washington, and Alaska also regulate the fishing gear used in the fishery.

The 12-mile contiguous fishery zone effectively curtailed fishing by foreign fleets for Pacific shrimp.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT

Potential for growth and development in the U.S. shrimp fishery is based on the

--improvement of stocks through effective management,

--commercial development of underutilized species, and

--utilization of new gear and techniques to increase catches per unit effort.

Resource Availability

Opportunities for an expansion of the amount of resource available depend on

--discovering new shrimp stocks,

--implementing effective programs to improve the status of currently utilized stocks, and/or

--developing a major commercial effort to harvest several underutilized stocks.

Because the discovery of unknown stocks is not likely, increases in resource availability may only be possible through an improvement of existing stocks or the commercial development of underutilized stocks.

Stock improvement

Improvement of the North Atlantic shrimp stock may be possible. Biologists believe that reductions in landings are necessary to permit the stocks to rebuild. As discussed above, the fishery was closed in early 1976. Recommendations for the 1977 season are yet to be considered.

In the South Atlantic area, the shrimp fishery appears to be operating at or near the MSY under present fishing

practices. Fishery managers and scientists have identified opportunities for better management. For example, higher yields could be obtained by increasing the age at capture in some areas.

In the Gulf of Mexico, opinions among NMFS personnel vary as to resource availability. Some say that sufficient data do not exist to estimate the biomass, establish an MSY, or formulate a management program. Other NMFS personnel contend that the gulf fishery is operating at or near the MSY--i.e., fully exploited under present fishing practices.

Commercial development

Some Gulf and South Atlantic species are harvested in limited quantities; none constitute a major commercial enterprise. These species include rock shrimp, caught mainly in shallow waters along the Florida coast, and royal red shrimp, caught in deep water (150 to 250 fathoms).

In the future, a potential for major commercial activity may develop for these species and offer an alternative to fishermen who may become displaced from the present shrimp fishery or other fisheries.

On the Pacific coast, some opportunities exist in Alaska for developing underutilized shrimp resources, but development depends on harvesting being economically viable.

Harvesting capability

New harvesting techniques may allow more shrimp to be caught for each unit of effort expended by the fishermen; that is, more efficiency, not greater aggregate catch. These increases in catch per unit effort may result from the use of twin-trawls, metal traps, onboard headers, electric trawls, and separator trawls.

Some shrimpers are now using twin-trawling techniques--towing two trawls on a single pair of otter doors--on an experimental basis. Advantages of this gear over the conventional double rig include:

--Increased fishing efficiency (an increase of 8.6 percent has been demonstrated).

--Ease of handling and the light weight of two 35-foot trawls as opposed to a single 70-foot trawl.

--Slower towing of nets and sharper vessel turning with fewer incidents of tangling.

A recent innovation in the Atlantic has been the introduction of metal traps, similar to lobster traps. Use of these traps makes possible shrimp harvesting in rocky areas inaccessible to trawls. Some conflict may arise, however, where metal traps and trawl gear are used on the same fishing grounds.

Another device is an onboard heading machine which offers the possibility of reduced labor costs. A Texas-based firm claims to have developed such a device.

Research into variations of shrimp trawls has been and is being done. The objective of this work is to increase harvesting efficiency.

--Electric trawl -- the principle is to administer an electric charge to force shrimp from their habitat and to harvest as they emerge. The objective is to (1) increase catch per unit effort, (2) provide a harvesting capability at times when shrimp are burrowed into the bottom, and (3) force shrimp from untrawlable areas such as coral and sponges.

--Separator trawl -- the principle is to prohibit the entry or allow the escape of finfish while trawling so that less "trash" fish are brought aboard. This reduces the culling effort as well as provides for the conservation of those fish which would ordinarily be discarded. The project to develop a separator trawl was about half complete in early 1976. NMFS personnel feel that the design goal of 90 percent separation of discards while limiting shrimp losses to 10 percent can and will be met.

Product development and processing

Improvements in processing and product development are not needed for the major commercial species. A capability exists to adequately process these shrimp in a manner acceptable and marketable to the consumer. Because consumer demand is forecasted to increase in the future a need for product development is not likely to arise.

Marketing Potential

The marketing potential is unlimited as currently seen--demand is far greater than any foreseeable supply potential. Shrimp markets are well developed and capable of absorbing increased supplies; however, State officials believe that some South Atlantic States could benefit by identifying and utilizing alternative markets and by improving existing markets.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

High operating costs, the magnitude of the harvesting capacity, and the limited size of the harvestable resources are obstacles to growth and development of the U.S. shrimp fishery.

Resource Availability

The primary obstacle inhibiting growth of the fishery is the limited amount of resource available for harvest. Opportunities to commercially develop or improve existing stocks, previously discussed, are coupled with specific inhibiting factors. Environmental deterioration is a potential problem which could affect existing stocks.

Stock improvement

Improved resource availability for the North Atlantic shrimp depends on effectiveness of the management program implemented by the Atlantic States Marine Fisheries Commission. The Commission closed the season indefinitely in 1976 and is waiting for recommendations for 1977. While biologists believe that reductions in landings will be necessary to permit the stock to rebuild, additional data on catch effort and the rate of stock replacement is needed to make appropriate recommendations for management.

The present State management systems in the South Atlantic are operating under several constraints, including biological information gaps such as mortality, growth, and spawner-recruit information, inadequate catch and effort statistics, insufficient social and economic data, lack of jurisdiction in waters outside State control, and enforcement problems.

Commercial development

Commercial development of the unused resource available in Alaskan waters depends on harvesting being economically viable, as the unused resources are in high-risk and high-cost areas.

The Bering Sea segment of the fishery is depleted--stocks have been so reduced that fishing effort must be greatly reduced so that stocks can replenish themselves.

Commercial development of the royal red shrimp and rock shrimp of the South Atlantic and Gulf of Mexico is limited. Research efforts so far have not shown that

quantities are available for major commercial development. A Texas study concluded that rock shrimp probably cannot support a fishery alone, but may supplement the brown shrimp fishery if stable markets are created. NMFS exploratory fishing for the deepwater crustaceans located some resources, but not in sufficient quantities to encourage commercial development.

Environmental considerations

A potential problem, which could affect available resources, involves sustaining environmental conditions to assure that the general level of shrimp stock will continue to be available in the future. The success of recruitment and survival depends heavily on environmental conditions in the nursery areas, which are subject to pollution from various sources including dredging and urban and industrial construction and growth.

Environmental deterioration of the Mississippi Delta System is a major concern. The Delta estuaries and wetlands form a resource that, in view of biological productivity, must be considered one of national importance. The delta estuaries of Louisiana's coast account for about 25 percent of the total fish harvest of the conterminous United States.

For the most part, Gulf shrimp resources are annually renewable and consist of short-lived animals with a life cycle of oceanic and estuary phases. Marked fluctuations in the size of shrimp populations can probably be induced by yearly differences in spawning success and survival of young which depend to a large extent on biological and physical environmental conditions.

During the past 30 years about 500 square miles of delta land mass has been lost. Some environmentalists interpret the decline in catch per unit of effort as indicative of estuary deterioration. By 1973 the amount of shrimp landed for each unit of effort declined to less than half the 1967 level.

Harvesting capability

Capability to harvest the available resource may exceed that necessary for an optimal harvest and is subject to increasing operating costs.

APPENDIX III

Harvesting capacity

Stock depletion in the North Atlantic is directly related to an intense buildup of fishing effort resulting in a harvesting level greater than stock replacement. Biologists believe that environmental factors have also contributed to the stock decline. In 1967 there were 89 vessels; in 1972 about 400. Because of this increase in vessels, and the decline in stocks, this fishery is considered to have excess harvesting capacity. The extent of this excess, however, has not been determined since there is a wide variation in vessel size and many vessels also harvest other species.

The catch per unit effort in the South Atlantic is quite low due to the large number of vessels. Only the high price of shrimp enables many vessels to operate at a profit. It is easier to enter vessels in the fishery than to remove them because these capital investments have low resale values. Consequently, investment in vessels may have exceeded an optimal level.

The shrimp harvesting capability along the Gulf coast appears to exceed that required to harvest the available resource. Shrimp landings over the last 11 years or so have been essentially constant. Generally, the catch per unit of effort has decreased which indicates more intensive effort for a relatively constant level of shrimp stock (i.e., more vessels and increased fishing power).

Operating costs

Increased fuel, insurance, and financing costs have been a major problem for fishermen. Fuel costs (diesel) have increased 300 to 400 percent since 1973, insurance rates are up dramatically--especially for wooden hulls--and interests rates are high. Costs of gear continue to rise. Equity requirements (25 percent) were high for financing new vessels even before all these other cost increases occurred. Meeting the equity requirement is now more difficult because of the high vessel cost; $100,000 to $200,000 and more in some cases. Credit is a serious problem.

Of course, much of these costs have to be included in the cost of shrimp, but elasticity of market acceptance determines the extent to which these costs can be transferred. If the market prices do not rise proportional to increased operating costs, the return per unit of effort will decrease, especially considering the decreasing catch per unit of effort; a lower value per share for the crew could result, as well as lesser quality and crew availability.

In the labor market, low wages and seasonal employment result in a labor shortage. Frequent personnel changes also decrease operating efficiency of a crew.

The adoption of new gear and methods is sometimes slow because fishermen resist change.

The harvesting efficiency of shrimp fishermen may be improved by the adoption of electric trawls currently available. This has not been done, not only because the required conductive tow cable now available is more expensive than conventional cable, but also because the loss of an electric trawl represents a loss of about $3,000 to $4,000 versus $1,000 for loss of a conventional trawl.

Product development and processing

Although dock and supply facilities, as well as storage space and the adequacy of local processing, appear to be rather limited in most areas of the South Atlantic United States, no product or processing obstacles exist for the major species. There is a reluctance on the part of processors to handle the underutilized royal red and rock shrimp due to processing problems which include the small size of the shrimp and the hardness of their shells.

Market development

No obstacles to market development were found. The shrimp market is well developed and capable of absorbing increased supplies.

Management Controls

Problems associated with fishery management in the North and South Atlantic have been discussed. We found no management controls that inhibit development of the shrimp fishery in the gulf or Pacific.

EFFECTS OF THE 200-MILE LIMIT

Atlantic coast

The northern shrimp is subject to management under the Fisheries Conservation and Management Act of 1976. The South Atlantic shrimp is caught predominantly within 3 miles of the U.S. coast and is expected to remain under the exclusive jurisdiction of the States.

Gulf of Mexico

About 40 percent (using 1975 statistics) of the shrimp caught by U.S. fishing craft off U.S. shores are in the 12-to-200-mile zone. Thus, the 200-mile extended jurisdiction will provide protection for a large part of the domestic shrimp fishery.

The 200-mile limit will permit regulating foreign vessel activity, but the foreign activity in recent years has not been significant in relation to U.S. vessel activities off foreign shores (primarily Mexico and the Northeastern coast of South America).

Unless other countries permit U.S. vessels to continue using their waters, the extended jurisdiction policy will force many U.S. vessels into U.S. waters. This increase in the U.S. shrimp fleet may not be offset by the exit of foreign vessels and may add to the fishing effort, resulting in a lower catch per unit of effort exceeding the relative stock available to U.S. shrimpers. Cuban vessels, active in U.S. waters, harvested less than 2 million pounds of shrimp in 1973, 1974, and 1975; Mexican activity in U.S. waters was not significant.

In addition, the extended jurisdiction will provide protection for the deepwater crustaceans if extensive commercial development moves in that direction.

Pacific coast

Since the majority of all Pacific coast shrimp resources are within the 12-mile contiguous fisheries zone and are already protected from foreign fishing fleets, establishing a 200-mile limit would have no effect on the shrimp fisheries.

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As discussed above, problems exist in the shrimp fishery along each coast. Some of the problems which are interrelated and common to more than one coast are:

--Lack of or limited availability of shrimp resources.

--Excess harvesting capacity.

--High operating and financing costs.

--Biological data gaps.

--Habitat environment deterioration.

The more critical areas needing solutions are the Pacific and North Atlantic areas in which some action has already been initiated: quotas in the Pacific and temporary closure of the North Atlantic.

The lack of or limited availability of resources seems to be the problem of most concern. The main causes for the problem may be attributed to increased fishing pressure and, as some believe, deteriorating environmental habitat. Secondary causes may be common property nature of the resource, unlimited entry, lack of management, and growing markets.

Imports

Imports are needed to meet the domestic market demand. In most periods the increases in imports and domestic production have not been so large as to exceed the growth in demand.

Possibly, from the consumer's viewpoint, any protective policy would result in even higher prices during periods of reduced domestic landings. However, if the imported shrimp were to have an undesirable effect on the domestic market, the Government could take action to either ban part or all of the imports or levy an import tax.

The future growth of the shrimp industry appears to depend heavily upon imports.

Gulf States fishery

In the Gulf States fishery a limited entry or effort policy probably would not, in any given year, result in a large increase in domestic landings. The relatively constant supply provided by the annual crop in itself limits shrimpers' participation in the fishery. Even though higher shrimp prices may attract additional investments, which would probably increase harvesting capacity and further reduce the catch per unit of effort, the shrimpers' acumen and level of accepted risk will probably determine the measure of the shrimper's success.

In the case of the Gulf States, limiting entry to a specific number of shrimpers would be primarily an egalitarian action to guarantee a high level of economic benefits without a guarantee that efficiency will dramatically increase or that the price of shrimp to the consumer will be lower or remain the same.

APPENDIX III

South Atlantic fishery

A comprehensive management plan proposal was completed in May 1975 for the South Atlantic shrimp fishery. Its implementation should resolve some of the problems in this geographical area.

TUNA

Tuna is the most international of all fisheries. Distribution of tunas occurs throughout the tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. The tuna family, apart from whales, is the only commercial species to cross wide stretches of ocean in the course of migrations.

The five main tuna species are skipjack, yellowfin, albacore, bigeye, and bluefin. Worldwide in 1972, skipjack tuna accounted for 35 percent of the total tuna catch; yellowfin, 31 percent; albacore, 17 percent; bigeye, 9 percent; and bluefin, 8 percent. According to the Inter-American Tropical Tuna Commission (IATTC), the Pacific Ocean accounted for approximately 68 percent of the 1970 total world tuna catch, the Atlantic Ocean produced about 25 percent, and the Indian Ocean about 9 percent. In 1975 tuna caught within 200 miles of U.S. shores--primarily albacore--accounted for 11 percent of the total U.S. catch.

Although more than 40 nations capture tuna, the 5 major producing countries accounted for 86 percent of the 1972 world catch of the 5 main species. Japan and the United States account for over half of the world tuna catch, and in 1974 consumed about 75 percent of the world catch. Nearly all the U.S. tuna consumption is in the form of canned tuna, with albacore tuna, being the most expensive and preferred.

STATUS OF THE FISHERY

Current harvest

Tuna landings in the United States, including Puerto Rico and American Samoa, in 1975 were a record 568.2 million pounds worth $152.8 million. In 1974 yellowfin tuna accounted for 61 percent of the total harvest; skipjack, 27 percent; albacore, 9 percent; and bluefin tuna, 3 percent. The U.S. tuna fleet caught 503.9 million pounds or 89 percent of the total 1975 U.S. catch off foreign shores. In relation to other U.S. fisheries, tuna ranked second in terms of pounds landed and third in terms of dollar value in 1975.

As shown in table I, the commercial tuna landings in the Atlantic, Gulf, and Pacific regions have remained relatively constant since 1970, whereas the total pounds landed in Puerto Rico have more than doubled. Approximately one-third of the landings made by the U.S. fleet in 1975 were in Puerto Rico.

Table I

Commercial Landings of Tuna, 1970-75 (note a)

Year	Atlantic, Gulf and Pacific States	Puerto Rico	Total
	----------000 omitted----------		
1970	393,494	[b] 84,852	478,346
1971	346,146	[b]128,770	474,916
1972	387,032	[b]147,668	534,700
1973	346,571	172,492	519,063
1974	386,185	165,008	551,193
1975	391,149	[b]177,100	568,249

a Expressed in pounds.
b Includes a small quantity of fish landed in American Samoa by United States vessels.

Source: U.S. Department of Commerce, National Marine Fisheries Service, "Fisheries of the United States, 1975."

Products and processing

During 1974, according to a report by the Tuna Research Foundation, the U.S. tuna processing industry packed canned tuna valued at $820 million at the processor level, $102 million of petfood, and $17.4 million of tuna fishmeal and oil, for a total value of $939.4 million. Canned tuna is the largest segment of the domestically produced canned fish market, representing, in 1974, 69 percent of the market's volume and about an equal amount of its value.

The two major U.S. tuna canning areas are in California and Puerto Rico. The percent of total pack processed (at 3-year intervals) was as follows:

Year	California	Puerto Rico	Other
1965	49.8	26.9	23.3
1968	45.2	32.0	22.8
1971	43.8	34.9	21.3
1974	43.5	40.1	16.4

Source: Tuna Research Foundation

The U.S. tuna processing industry is made up of 29 plants: the west coast has 20; Puerto Rico, 5; American Samoa, 2; Maryland, 1; and Hawaii, 1. The U.S. tuna industry has developed plant capacity to process about 7.3 million pounds of fish per day on a one-shift basis. Since 1965 Puerto Rico has become the most rapidly developing U.S. tuna processing center. One large new processing plant was constructed in Puerto Rico in 1971 at a cost of $10 million and a total of $30 million has been invested in two new facilities in San Diego, California, and American Samoa.

Markets

Tuna consumption has been increasing steadily since World War II. The U.S. canned tuna per capita consumption rate has risen 1.8 pounds between 1950 and 1975 while the total canned fishery product per capita consumption rate has decreased .7 pounds during the same period, an increase of 164 percent versus a decrease of 14 percent, respectively.

U.S. consumers continue to constitute the major world market for tuna. Domestic production in 1975 filled about 51 percent of the Nation's total supply. Another 538.5 million pounds of foreign-caught tuna was imported. Table II shows tuna imports from 1970 through 1975.

Table II

Tuna Imports, 1970-75

(note a)

Year	Fresh frozen, including cooked loins & discs	Canned		Total
		In oil	In brine	
	----------000 omitted----------			
1970	464,583	153	72,109	536,845
1971	506,602	1,050	58,792	566,444
1972	764,784	384	56,129	821,297
1973	816,739	244	38,382	855,365
1974	838,889	233	52,513	891,635
1975	486,795	199	51,472	538,466

a Expressed in pounds.

Source: U.S. Department of Commerce, National Marine Fisheries Service, "Fisheries of the United States, 1975."

These imports increased 66 percent from 1970 to 1974 but decreased significantly in 1975 as canners cut back on their use of imported tuna in order to reduce inventories.

A U.N. report states that a close relationship exists between trends in tuna prices in the United States, Japan, and Europe. Value differences among species are related to market preference, fish size, the resulting yield during processing, labor costs, and quality. Albacore has the highest market preference in the United States because of its white color and bland flavor. Because skipjack has the lowest yield (number of cases per ton of raw fish) and is the least popular it has the lowest value.

The U.N. report also noted that U.S. prices were weak during the early 1960s, having been considerably higher in 1954 and 1955. Since 1964 prices have begun to rise, as world supplies have begun leveling off. The trend in prices for raw materials was clearly upward in the mid-1960s and sharply higher in the 1970s. According to NMFS, the pressure of tuna's expanding demand relative to a fixed supply will put increasing pressure on tuna prices.

Fishing fleet

The U.S. tuna fleet is based primarily in southern California and operates from San Diego and San Pedro. We were told the fleet is composed of three types of fishing vessels; purse seiners, baitboats, and trollers. Purse seiners generally locate tuna schools by visually locating porpoises. The majority of the yellowfin tuna catch is caught in association with porpoise, as the two species swim together. Porpoise swim on the ocean's surface while yellowfin tuna swim at lower depths. When porpoise are observed, the purse seiner's captain encircles both the porpoise and tuna with a large net with a circumference of up to three-quarters of a mile. The bottom of the net is then closed, or "pursed," forming a large bag or purse, trapping the enclosed tuna. The net is then pulled aboard the vessel and the tuna are placed in refrigerated holds. This method of catching tuna is referred to as fishing "on porpoise" because it results in the incidental catch of porpoises.

The U.S. purse seine fleet consisted of 139 vessels with an aggregate carrying capacity of 115,400 tons in 1975. An NMFS official told us that larger purse seiners ranged from 200 to 275 feet in length with carrying capacities up to 2,675 tons, and when fully equipped cost from $3.5 to $5 million each. The usual crew size is 10 or more men. We were told the U.S. purse seine fleet is capable of fishing in any of the world's oceans, with the majority of the

fishing concentrated in the eastern Pacific off Central and South American coasts. The primary species caught are the yellowfin and skipjack tunas. An NMFS official said that purse seiners capture over three-quarters of the U.S. tuna catch and are vastly superior in terms of catch per unit of effort expended, compared to other methods of tuna fishing.

Baitboats catch tuna differently than purse seiners. When a baitboat locates a tuna school, live bait is thrown overboard in an effort to lure the tuna to the boat. When the tuna begins to feed actively, they are fished with poles, to which are attached baited hooks or lures. With each strike, the crewmember pulls the tuna aboard the vessel.

An NMFS report stated that the baitboat fleet had 53 vessels in 1975, with an aggregate carrying capacity of 5,253 tons. The baitboat's crew size ranges from 4 to 10 men. We were told baitboats capture primarily yellowfin, skipjack, and albacore tuna, usually off Mexican and Central American coastal waters.

An NMFS official told us that tuna trollers fish primarily for albacore tuna. Since albacore do not school as cohesively as yellowfin or skipjack, according to NMFS, the troller depends upon attracting albacore with a variety of hooks and lures, using possibly 10 to 14 lines. When an albacore strikes a lure, the fisherman hauls it aboard, places it in the hold, resets the line, and continues fishing.

Trollers make up the bulk of the U.S. tuna fleet with approximately 2,000 vessels. These vessels may be crewed by one to three men. Trollers fish for albacore from northern Washington to central Mexican waters.

The U.S. tuna fleet's capital financing came from personal investment, tuna processors, and government financial assistance programs. Tuna processors assisted in financing vessels to assure themselves of raw material through contractual agreements with vessel owners. As of 1969, 115 vessels in the U.S. tuna fishery had received $26.4 million from government financial assistance programs.

According to Living Marine Resources, Incorporated, tuna vessels in 1974 represented over 30 percent of the replacement value of the entire U.S. fishing fleet. At 1974 construction costs, the replacement value of the tuna fleet was just under $500 million.

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Employment

A tuna industry survey indicated that the tuna fleet provided direct employment for about 6,800 people, with a payroll of about $65 million during 1973. Tuna processing plants employed a total of about 16,000 people in administrative and factory tasks in 1973. Total payroll was in excess of $90 million.

Recreational fishing

In the Atlantic Ocean, the bluefin tuna is of interest to both recreational and commercial fishermen. Because major commercial fisheries are located far from the recreational fishing areas, direct conflicts on the fishing grounds do not usually arise. However, both recreational and commercial fishermen harvest from the same stocks. An NMFS report showed the Atlantic recreational tuna catch to be 10.5 million pounds in 1970.

In the Pacific Ocean, albacore and bluefin tuna are of interest to recreational fishermen. A 1971 California Fish and Game Department report stated that sport anglers consider albacore to be one of the more desirable gamefishes for recreational fishing. Most sportfishing is done in southern and central California waters within 60 to 80 miles of shore. The report also stated that sportsmen are keenly interested in catching bluefin tuna in California and the partyboat industry development has made bluefin more accessible to sportfishermen. The NMFS report showed that 8 million pounds of tuna were caught in the Pacific by recreational fishermen in 1970.

Management controls

Internationally, four commissions study and/or manage the tuna resource. The Inter-American Tropical Tuna Commision (IATTC), established in 1950, was composed of eight member nations in 1976: Canada, Costa Rica, France, Japan, Mexico, Nicaragua, Panama, and the United States. The IATTC's function is to (1) study tropical tunas and other fish caught by tuna fishing vessels and (2) recommend joint conservation measures to maintain the species around maximum sustainable yield. The IATTC has implemented conservation measures by establishing a harvesting quota which limits the yellowfin tuna harvest in an area known as the commission's yellowfin regulatory area (CYRA). CYRA extends from north of San Francisco, California, to northern Chile (see figure 1), and encompasses approximately 5 million square miles. According to an NMFS official, the IATTC has succeeded in maintaining the yellowfin tuna resource.

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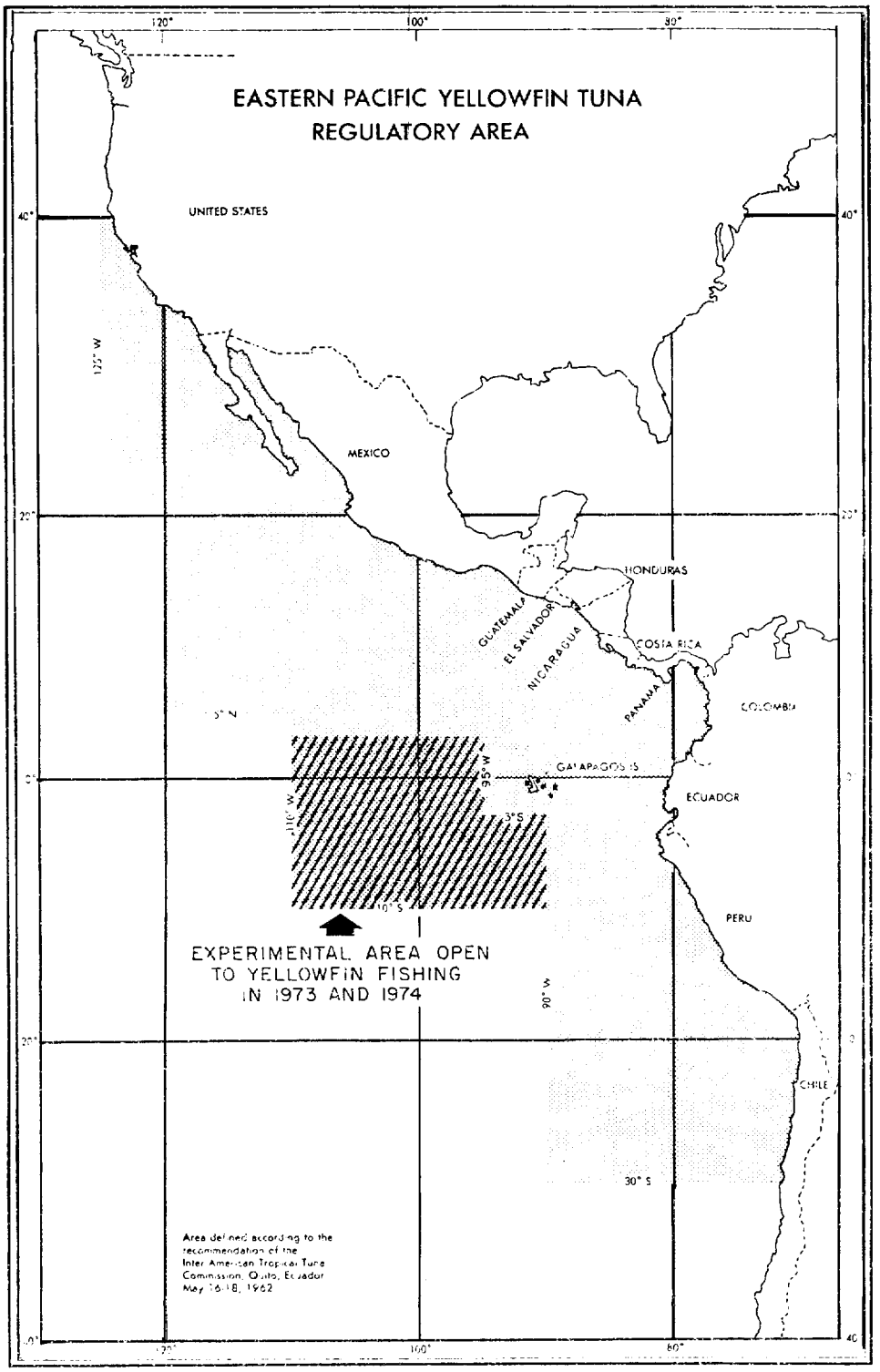

FIGURE 1

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In 1969 the International Commission for the Conservation of Atlantic Tunas (ICCAT) was established with responsibility for the scientific study and management of tuna and billfishes in the Atlantic Ocean. In 1976 members of the ICCAT included Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Republic of Korea, Morocco, Portugal, Senegal, South Africa, Spain, and the United States. The ICCAT has taken steps towards establishing a conservation program for bluefin tuna caught in the Atlantic Ocean.

The two remaining international commissions are the Indian Ocean Fishery Commission and the Indo-Pacific Fisheries Council. They are concerned with all the fisheries of the Indian and western Pacific Oceans and were established within the framework of FAO. Neither of these bodies has a research staff or permanent secretariat and, as a result, the work accomplished is from working groups of scientists affiliated with other organizations. These commissions promote programs of fishery development and conservation and encourage cooperation and coordination between member nations.

In addition to the international commissions, tuna fishermen are also affected by the Marine Mammal Protection Act of 1972, which placed a moratorium on the taking of marine mammals by any individual or vessel subject to the jurisdiction of the United States. This act directly affected the U.S. tuna fishing industry, as the harvesting method primarily used by U.S. tuna fishermen--purse seining--involved the incidental killing of porpoise.

The State of California has also imposed regulations on minimum weights for tuna.

OPPORTUNITIES FOR GROWTH

Resource availability

A 1974 NMFS report stated the western Pacific and Indian Oceans are the only areas in the world where large-scale expansion of the tuna fisheries may be possible. Within the Western Pacific, the catch of skipjack tuna could be expanded. The NMFS report indicated that although the current harvest was 200 million pounds, the annual skipjack harvest could range up to 2 billion pounds. This resource lies in an area of 11 million square miles, with U.S. flag or trust islands strategically positioned throughout. NMFS reported that with small exceptions the resource is not utilized by U.S. interests. The current annual harvest is made primarily by foreign vessels.

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In the Indian Ocean considerably less is known about the abundance and distribution of the tuna resource than in the western Pacific. According to an FAO report, the aggregate potential of the fishery may run as high as 660 million pounds a year.

Harvesting capability

An NMFS official informed us the U.S. tuna fleet has the capability to harvest the available resource in the eastern Pacific traditional fisheries. In the western Pacific, new harvesting techniques are being developed to allow capture of the skipjack. (See p. 263.)

Product development and processing

A representative of one of the major tuna processors told us that processing capability exists to adequately process and market all harvested tuna in a manner acceptable to the consumer.

Marketing potential

Demand for tuna in the United States has been growing more than 6 percent a year since 1965 and, according to a 1974 FAO report, is expected to continue upward in the world's main markets.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT

Resource availability

By 1971 NMFS officials considered the stocks of temperate and tropical tuna species in the traditional grounds were being exploited at nearly their potential maximum. An NMFS official informed us that the increased 1970-75 domestic tuna catch resulted, in part, from a greatly intensified fishing effort by U.S. purse seiners. Future sustained catch increases of yellowfin and albacore tuna are not expected in the eastern Pacific traditional fishery.

In addition, U.S. fishermen are having difficulty in using their traditional tuna fishing grounds in the eastern Pacific because of the trend toward extended national jurisdiction over fishing resources.

Harvesting capability

Harvesting obstacles center around (1) overcoming problems in harvesting skipjack tuna in the western Pacific, (2) the

overcapitalization of the purse-seine fleet, and (3) effects of the Marine Mammal Protection Act on purse seining for tuna.

The skipjack tuna, an underdeveloped resource in the western Pacific, is caught by U.S. fishermen in the eastern Pacific by two techniques, bait fishing or purse seining. Bait fishing throughout the western Pacific is hindered by the lack of adequate bait supplies. An NMFS report stated that a large expansion of a U.S. or trust territory bait-boat fishery in this region is predicated upon development of a reliable supply of good bait.

The other technique, purse seining, is used effectively to catch yellowfin and skipjack tunas in the eastern Pacific, but it appears that harvesting methods used in other regions are not transferable to the western Pacific. Pacific skipjack tuna exist in very clear water with complex currents. Clear water increases the chances that the tuna may evade a conventional net and complex currents hinder the net's sinking rate. Additionally, the skipjack's movement patterns are hard to predict, making it extremely difficult to position a vessel to drop a net. These characteristics make it difficult to purse seine skipjack tuna. NMFS officials feel that skipjack catches will increase, and perhaps substantially so, if fishing techniques can be altered. A joint industry-government program was established in 1974 to develop new techniques.

The buildup of more vessels than needed to harvest the tuna resource in the eastern Pacific is an example of how overcapitalization occurs in a fishery. The rise in tuna prices during the 1960s resulted in excellent profits which encouraged new vessel construction. This new construction, primarily large purse seine vessels, expanded the U.S. fleet from 41,400 tons of catch capacity to 124,300 tons over the period from 1967 to 1975. A consultant reported that foreign interests also expanded their fleets. The additional vessels resulted in the fleet capacity being substantially larger than required for harvesting of the tuna stocks in the eastern Pacific. This led to a drop in catch per ton of U.S. fleet capacity from 5.03 tons in 1967 to 2.06 tons in 1975, a 59-percent decline.

Fuel costs doubled between 1972 and 1975; considering the great distances the tuna fleet travels (thousands of miles to Central and South America, and even further to eastern Africa), fuel costs greatly affect the fishery. NMFS reported that a 1,200-ton capacity seiner will use around $200,000 worth of fuel a year. In the past, yearly tuna

price increases had helped to offset rising costs and declining harvests. In 1975, however, the fleet's catch brought lower prices and earnings suffered appreciably. NMFS estimated that all but the largest vessels were in a net loss financial position in 1975.

The Marine Mammal Protection Act of 1972 established as a goal that the incidental marine mammal kill rate approach zero mortality; commercial fishermen were allowed 2 years to reduce mortality without penalties. NMFS, which has the responsibility for enforcing the act, permitted the tuna industry in late 1974 to continue purse seining in order to further develop new fishing gear. NMFS engaged in research with industry in an attempt to design gear or techniques that would reduce the incidental killing. New gear and techniques were developed with resulting decreases in the incidental killing from over 300,000 in 1972, to 179,000 in 1973, and 98,000 in 1974. However, when in 1975 the incidental killing increased to 134,000, several environmental groups filed suits demanding purse seining be stopped. An official of the Marine Mammal Commission reported they requested NMFS set a maximum quota on the marine mammal kill for 1976 to return to the 1974 level or better. NMFS refused, however, to set a quota before the 1976 season. An NMFS official said they intended to set a quota in early 1976 if the number was not reduced. But in May 1976 a U.S. Federal District Court judge ruled that purse seining "on porpoise" for tuna violated the Marine Mammal Protection Act and ordered the U.S. tuna fishing industry to stop purse seining for tuna. An NMFS official said that following an appeal of the District Court's ruling to the Third Circuit Court of Appeals, an indefinite stay was placed on the lower court's ruling, pending the Circuit Court's review and decision concerning the ruling. In the meantime, NMFS had placed a quota of 78,000 on the allowed incidental porpoise killing.

We were told the effect of this court ruling is yet to be felt, but if unaltered, it will lower the domestic yellowfin harvest. Both NMFS and tuna industry officials agreed that the killing of porpoise is an unavoidable element in the most efficient tuna catching technique currently employed by U.S. fishermen.

According to NMFS, a bill (H.R. 13865) designed to overturn the District Court's ruling was introduced on May 18, 1976. This bill would allow the Department of Commerce unrestricted authority, after December 31, 1976, to establish regulations governing the killing of marine mammals. As of July 1976 the bill was pending before the House Committee for Merchant Marine and Fisheries.

Product development and processing

We were informed by an industry official that product development and processing does not present an obstacle inhibiting growth and development of the tuna fishery.

Market development

An industry official told us that no obstacles exist in tuna market development. According to an industry consultant, the slow growth rate of the tuna industry is a result of limitations in the supply of tuna being harvested rather than of marketing problems.

Management controls

An October 1975 internal NMFS report stated that fishery management controls and regulations have reduced and could eliminate the access of U.S. tuna fishermen to the traditional tuna resource in the eastern Pacific. This reported reduction and potential elimination, has resulted from inequalities in control and management imposed upon U.S. fishermen as compared to foreign tuna fleets in the fishery.

NMFS and industry representatives gave the following examples to show how this inequality affects U.S. tuna fishermen. First, U.S. tuna fishermen are subject to regulations protecting marine mammals to which other nations are not subject. According to NMFS, the porpoise-saving requirements of the Marine Mammal Protection Act imposed on domestic fishermen are not similarly enforced by foreign governments on their fishermen. The United States is the only country which imposes regulations on the killing of porpoise. An industry representative told us the additional gear and catch procedures, necessary to reduce the porpoise killing, result in increased cost and time loss. This reduces the U.S. tuna industry's competitive position in the world tuna market.

Second, international tuna fishing restrictions in the eastern Pacific are only enforced upon U.S. tuna fishermen. According to NMFS, U.S. fishermen fishing for yellowfin tuna in the eastern Pacific are subjected to inequitable treatment relative to foreign fishermen. While the U.S. Government strictly enforces the IATTC recommendations, none of the foreign governments whose fishermen participate in the yellowfin tuna fishery within the CYRA has adequate regulations or enforcement procedures to insure IATTC's conservation program is honored. Most of the foreign governments

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do not have the means to insure compliance from their large vessels. NMFS reported that all countries with large capacity vessels have ignored the fact that their vessels fish freely in the CYRA during the closed season despite offers by the United States to utilize its monitoring system. This inequity is important since, according to NMFS, the quantity of yellowfin tuna taken during the closed season is estimated by the IATTC and is considered in arriving at the annual quota. The proportion of the yellowfin quota available to the U.S. fleet in the CYRA each year is being progressively reduced because the quantity of yellowfin tuna taken by foreign fleets during the closed season is increasing each year. NMFS believes if the foreign fleets continue to grow rapidly and if nothing is done to correct this, the U.S. fleet will soon be eliminated from the CYRA.

Third, the United States has not utilized available sanctions to compel foreign tuna fleets to comply with national and international regulations and restrictions. According to NMFS, the United States, through provisions of the Marine Mammal Protection Act of 1972 and the Fishermen's Protective Act of 1967, has the authority to attempt to discourage foreign tuna fishermen from fishing "on porpoise" and fishing not in accordance with IATTC conservation recommendations. Provisions in both acts call for importation prohibitions against foreign countries fishing in opposition to the acts. Both NMFS and industry representatives stated that the United States has never taken any sanctions against foreign fishermen for repeated violations of national or international regulations. An NMFS official stated that if the U.S. Government is going to enforce economically detrimental regulations upon U.S. fishermen, it should also bar imports from foreign fishermen.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

The Fishery Conservation and Management Act of 1976 established a 200 nautical mile fishery conservation zone contiguous to the territorial waters of the United States. The act excludes highly migratory species, such as tuna, from exclusive management authority of the United States. However, the act does encourage implementing and enforcing international agreements for highly migratory species.

NMFS, IATTC, and the U.S. tuna industry representatives anticipate this act will have a negative effect on the U.S. tuna fishery. We were told the following problems could result from implementing this act.

--Reduced U.S. access to traditional fisheries:

An industry representative stated the enactment by the United States of a 200-mile conservation zone will sanction existing conservation zones and encourage other coastal nations to establish zones. Industry, IATTC and NMFS officials believe this will eventually force the United States out of many traditional fishing grounds and lessen the domestic tuna catch.

--Increased operating costs and fishing restrictions:

An industry consultant reported that if foreign nations license U.S. vessels to fish within their 200-mile conservation zones, the fees could add $100 to $200 thousand a year in operating costs for each purse seiner, which could make licensing fees equal to fuel costs.

In 1973 for example, Ecuador, which had an established 200-mile fishing zone, assessed a licensing fee of $55,000 per trip for a 1,100-ton purse seiner. Costa Rica, another country with a 200-mile fishing zone, proposed in 1975 to charge a similar size purse seiner $71,500 for an initial fishing permit, with a renewal fee of $66,000 for 60 additional days.

An industry representative informed us Mexico and Costa Rica may require that their nationals be employed as crew members by U.S. vessels fishing in their territorial waters. Foreign crew requirements may approach 75 percent.

--Endangered international fishery control:

An IATTC official stated the IATTC is near collapse due to the enactment of fishery conservation zones. The coastal nations in the IATTC are setting up a new commission designed to allow each nation to control the resource within its own zone. According to the IATTC and tuna industry representatives, national control of tuna will not be effective because of the international migration patterns of the resource. They claim tuna management must be internationally controlled.

The Fishery Conservation and Management Act of 1976, however, specifically includes sanctions designed to minimize the anticipated negative effects on the tuna fishery. The following four provisions were designed to reduce the negative effects.

(1) The Secretary of State is required to negotiate with foreign countries to obtain equitable access to foreign fisheries.

(2) The United States will not recognize foreign conservation zones if U.S. vessels are denied fishery access, or if restrictions or conditions imposed are unrelated to fishery conservation and management.

(3) The United States will not recognize foreign conservation zones if the foreign nation fails to agree that highly migratory species are to be internationally managed.

(4) The Secretary of State will impose importation prohibitions against some or all fishery products from a foreign nation which fails to negotiate fishery agreements, denies fishery access, disregards international agreements, or seizes U.S. vessels.

Tuna industry and IATTC officials do not believe the sanctions provided in the act will minimize the act's negative effects upon the U.S. tuna industry. According to a tuna industry representative, the United States has never taken effective sanctions against foreign nations for repeated violations of IATTC regulations, or for seizing U.S. vessels, although international agreements allow for sanctions against such violations. The industry representative stated there are no indications these new enforcement provisions would be utilized more effectively than past provisions. An industry consultant agreed the United States does not have, nor has ever had, a believable sanction program.

An NMFS report has concluded that import prohibitions on tuna or other fish products from a foreign nation would only impose an inconvenience until alternative markets were developed. With the high world tuna demand and limited resource supply, this inconvenience would be only temporary.

According to a tuna industry representative, even if the U.S. tuna fleet is granted fishing access within foreign conservation zones, it may still be eliminated from these fishing grounds. Elimination could result from anticipated decreases in annual catch quotas that may be imposed by foreign nations.

An IATTC commissioner reported that the U.S. tuna fishermen can, and probably will, be shut out of the major

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traditional fishing grounds unless the United States can negotiate access. He reported that the United States should make its best effort to negotiate using whatever leverages are available, even though there is little hope for success.

UNDERUTILIZED FISH RESOURCES

In addition to the utilized fish species supporting major fisheries, many other species are located in the U.S. coastal waters that are not used commercially or are currently only partially used.

Following are examples of selected underutilized species pointing out problems not only applicable to these species but also applicable to some extent to all underutilized species.

MULLET

Mullet are found worldwide in tropical and subtropical waters. In the Americas mullet are found from Maine to Brazil in the Atlantic and from Monterey, California, to Chile in the Pacific. The largest quantity, however, exists in North Carolina to Texas waters, with the primary fishery found along the gulf coast of Florida. Mullet are considered an underused species because the catch is far below the estimated potential yield.

STATUS OF FISHERY

Current harvest

The Florida mullet landings in 1972 account for about 89 percent by volume and 91 percent by value of the total U.S. landings of mullet. The following table shows Gulf States black mullet landings for 1972 by State.

State	Volume (pounds)	Value
Texas	90,700	$ 4,495
Louisiana	15,700	821
Mississippi	221,000	12,555
Alabama	1,513,300	88,689
Florida	28,853,900	2,556,307
Total Gulf States	30,694,600	$2,662,867

Although mullet are the primary species for several fleets in Florida, the fishery is declining. During the late 1950s and early 1960s annual mullet landings consistently exceeded 33 million pounds. This production figure has dropped below 30 million pounds, with production in 1974 listed at 29.1 million pounds.

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Annual and monthly mullet prices are quite responsive to the amount of mullet landed. Since the 1950s the dockside price of mullet has consistently been less than 10 cents a pound, even with continuing inflation and a secular increase in the prices of other seafood products.

Products and markets

Mullet are currently processed and marketed in four basic product forms. Mullet frozen in the round, that is without heading or gutting, account for an estimated 63 percent of the mullet landed. About 25 percent of the mullet landed is sold fresh throughout the year based on availability. Smoked mullet, making up about 6 percent of the landings, is a very popular item in Florida. Mullet roe has recently become important in the export market, which makes up about 6 percent of the landings. The principal market for roe is in Japan where it is processed into a dried and cured product called karasumi. Mullet are marketed in the southern part of the United States (65 percent) and in the major northeastern cities (35 percent).

Fishing fleets

In the Gulf States, there are no major fishing fleets exclusively for harvesting mullet. Mullet are harvested by several different fleets using a variety of gear which catch numerous species. Most of the catch is made by gillnet.

Employment

In the Gulf States, few fishermen are dedicated exclusively to catching mullet. Fishermen harvesting mullet also harvest a variety of other finfish species at certain times of the year, and most of them are individually independent.

Recreational fishing

Mullet are not in great demand as a sports fish. However, silver mullet are valued as a sport-fishing bait and are also considered an important food source for big game fish.

Management controls

At the present time there is no overall management scheme for mullet in the Gulf of Mexico. Total effort and harvest are not restricted. None of the Gulf States, except Florida, have any laws or regulations regarding mullet.

Florida has established a minimum length for black mullet and certain counties have laws regulating gear, fishing areas, and size restrictions.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Mullet have been regarded over the years as an extremely underused species. Although available in large quantities from North Carolina to Texas, total U.S. landings have never exceeded 45 million pounds in any one year. NMFS biologists estimate the maximum sustainable yield to be between 150 to 200 million pounds annually.

Harvesting capability

Mullet are relatively easy and inexpensive to catch because they school in the intercoastal waters and bays in large concentrations. They can be taken by gillnets, seines, cast nets, and trammel nets. Mullet fishing generally requires low capital investment and low operating costs. These conditions allow easy entry.

Product development and processing

Marketed mullet product forms are: fresh, frozen, smoked, and roe. Other product forms that are possible for increasing the use of mullet are canned, fillets, headed and gutted, and minced products. The actual potential for the products is not known.

Marketing potential

Alternatives for possible market expansion of mullet include expanding of existing markets, expanding into new geographical areas, expanding by using mullet in products such as fish sticks and cakes which are not identified to a particular fish but which are produced from other fish species, and expanding through the development of new products.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

Product development and processing

Black mullet have, traditionally, been sold fresh or frozen in the round at retail seafood markets. Consumer buying patterns have tended to shift toward food purchases

of processed convenience items at supermarkets and away from unprocessed items at smaller independent markets, a trend which hinders moving unprocessed fresh and frozen seafood items. Since mullet are sold primarily in the round, the consumer is not attracted.

Another factor hindering the development of mullet products is the technological problem of rancidity. This problem has limited the use of mullet as a processed item and has therefore kept the mullet industry from adjusting to changing-consumption trends and consumer-buying patterns. Efforts to resolve this problem have been sporatic, of low priority, and not very successful. Work in this area is continuing under a Federal grant. Resolving this problem will permit the development of new products and markets which should result in increased demand and use of mullet. The image problem is considered minor, compared to rancidity.

A lesser problem inhibiting the development of mullet products is the fact that mullet have a low dress-out factor--about 30 percent for boneless fillets and about 60 percent headed and gutted. This low yield results in a higher cost product. Mullet also develop off-flavors and odors resulting from feeding habits or from pollution in some localities.

Market development

Outside the coastal areas in which black mullet are caught and mostly consumed, an image problem exists. This problem is most prevalent in large metropolitan areas among consumers who think of mullet as a cheap food for low-income people. Also, because mullet are often sold in the round and needs cleaning many consumers hesitate to buy them.

Canned mullet and fresh and frozen headed and gutted mullet have been marketed on a test basis several times, but the results were not encouraging. However, development of a better product could provide a basis for successful marketing at a future time.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

The 200-mile-extended jurisdiction will have little impact on the fishery because most mullet harvested by U.S. fishing craft are caught within 12 miles off the coast. There is no foreign activity within 200 miles of the U.S. coast for this fish.

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CROAKER

The industrial groundfish and foodfish fisheries for Atlantic croaker in the northern Gulf of Mexico are relatively recent fisheries which began in 1952 and 1967, respectively. The fishing grounds that support the trawl fisheries for croaker are along the coast from Galveston, Texas, to Pensacola, Florida, and extend seaward from shore to a water depth of about 50 fathoms. Although both fisheries exploit the same stocks, basic differences exist. The industrial groundfish are used principally for pet food and to a lesser extent for bait and fishmeal, whereas the foodfish requires croaker for fresh-fish markets. Fishing vessels, gear, and tactics are similar but not identical among the fisheries.

Although croaker is considered a major fishery for the Gulf States, it is also considered an underused fish because large quantities are harvested (along with other finfish) incidentally as a bycatch during shrimp trawling and is returned to the sea (discarded), mostly dead. These bycatches are estimated to be as high as 18 to 20 pounds for every pound of shrimp caught, or about 2 billion pounds annually, of which the croaker is the major species.

STATUS OF FISHERY

Current harvest

The industrial groundfish catch in 1975 was 103.2 million pounds, valued at $2.7 million ex-vessel and $25 million processed. The croaker foodfish catch in 1975 was 9 million pounds, valued at 1.2 million dollars.

The following two tables show the trends in landings and value for the fisheries.

Landings and Value of the Edible Croaker Fishery 1971-75

Year	Pounds (Millions)	Dollars (Millions)
1971	8.4	1.0
1972	9.1	1.1
1973	13.2	1.7
1974	10.6	1.3
1975	9.0	1.2

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Annual Production by the Industrial Bottomfish Fishery
Northern Gulf of Mexico
1971-75

Year	Dollars	Thousands of tons
1971	1.7	45.4
1972	1.7	41.3
1973	2.5	50.8
1974	2.7	52.6
1975	2.7	51.6

The volume of fish discards--2 billion pounds--is only a crude estimate, because no one keeps a detailed record of discards. There is no established market value for discards. Based on the industrial groundfish ex-vessel price--about 2.6 cents a pound--the potential price range for discards is narrow.

Products and markets

Industrial groundfish, most of which are croaker, are used principally for pet food and to a lesser extent for bait, animal food, and fish meal. The pet-food market has shown gradual growth over the last 10 years to a peak in 1973. A slight decline in pet-food volume occurred in 1974 due to increasing use of animal byproducts to produce "gourmet packs" and a decreased market for canned cat food. Using industrial groundfish for fishmeal by a plant in Louisiana, converted from menhaden, has offset the decline in pet-food sales.

Croaker was very popular as a foodfish along the southeast Atlantic coast about 25 years ago and was caught in abundance. The catch peaked at 60 million pounds in 1945 but declined precipitously in succeeding years partly due to overfishing but mainly to several abrupt climatic changes that either killed the croaker or drove them out of their traditional area of abundance. In 1967 large croaker suddenly appeared in considerably large quantities, and a fishery was established in the gulf with ready markets along the Chesapeake Bay.

Fishing fleets

Presently 21 vessels operate fulltime in the industrial bottomfish fishery. These vessels range in length from 60 to 90 feet, with carrying capacities from 63 to 125 tons.

There is no movement of vessels into and out of this fishery due to the special arrangements of the holds and close ties among the vessel operators and processors. About eight of the vessels are owned by the processors.

At the start of the fishery in 1967, the foodfish croaker fleet was made up of large shrimp vessels, but vessel modifications were required as catches increased. These modifications were primarily in handling larger, more efficient trawls and in increasing the holding capacity.

The number of vessels engaged in the fishery include 26 full-time vessels and up to 40 additional part-time vessels. The part-time vessels are shrimp trawlers which fish for croaker during off-seasons for shrimp or when economic conditions are more favorable in the croaker fishery. Transition from the shrimp fishery to the croaker foodfish fishery is easily accomplished.

The following table shows the status of the fleets for both trawl fisheries as of 1973.

	Industrial fleet	Foodfish fleet
Number of vessels	21	26
Typical vessel length (feet)	90	78
Horsepower	470	350
Capacity (tons)	131	80
Replacement value of fleet	$4,675,000	$3,510,000

Employment

Employment statistics for these fisheries are not published by NMFS. The average crew size is three men for each vessel for both industrial and foodfish vessels.

Production employment levels are likewise not published, but NMFS personnel estimated that an average four to five employees at each of six fresh foodfish plants spend more of their time in activities relating to croaker. The combined employment level of the industrial bottomfish processors was estimated at 350.

Recreational fishing

Croaker is heavily exploited by recreational fishermen. In 1970 recreational fishermen in the Gulf of Mexico caught

an estimated 62.8 million pounds, compared to the commercial foodfish catch of 5.7 million pounds and the industrial groundfish catch of 102.2 million pounds.

Management controls

There is no overall management scheme for the Gulf of Mexico croaker fisheries. There are no Federal or State regulations specifically concerning croaker fisheries in the Gulf.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Croaker has one of the highest potentials among gulf fisheries for expansion and development and is currently vastly underused in terms of potential yield. Estimates of potential annual yield exceed 500 million pounds. Current landings are being taken from grounds that comprise less than 10 percent of the area over which the fish is distributed.

Harvesting capability

Harvesting capability in the Gulf of Mexico is more than adequate to satisfy the current market demands. Industrial groundfish fishermen are frequently assigned quotas by processors to limit their catches to match production requirements.

Additional opportunities for increasing the harvest exist if cost-effective methods are developed for sorting and storing croakers and other discarded species caught incidental to trawling for shrimp and foodfish croaker and for separating and storing the larger croaker caught incidentally in the industrial groundfish fishery.

Product development and processing

Additional product development could provide expanded markets for croaker foodfish. No technological breakthrough is required to produce the new products. Minced croaker flesh mixed with minced shrimp was once marketed in a frozen breaded form. According to manufacturers, most minced fish can be pressed into large fish blocks, which can be processed into a variety of possible items.

Processing improvements in the development of an efficient laborsaving machine to scale, head, and gut the fish could improve the cost price structure for minced products.

Marketing

Additional marketing opportunities exist for croaker fisheries by utilizing both small and large fish for the edible market and by expanding fresh-fish markets into new localities.

The Texas Parks and Wildlife Department has pursued market development of croaker on a city-by-city basis, starting with San Antonio. The name was enhanced to Golden Croaker to improve marketability, and the fresh fish were marketed at 28 grocery stores in San Antonio. During a 3-week period of heavy promotion, 31,000 pounds of croaker were sold at 50 to 60 cents a pound.

Additional opportunities being investigated by NMFS personnel include exporting a minced product called Surimi to Japanese processors who are looking for new sources of raw fish supply. Test samples of croaker indicate that a good potential exists for exporting Surimi to Japanese processors who use Surimi as an intermediate product. An NMFS marketing specialist estimated that within 3 years the export potential would be over 400,000 pounds a day.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT OF THE FISHERY

Resource availability

Croakers are estuarine dependent, and loss of this environment through land fills or pollution would affect population levels and stability.

Harvesting capabilities

The common concept of harvesting only prime species currently in demand, such as shrimp, and discarding the rest is a firmly established institutional pattern which hinders the development and use of other species.

Product development and processing

A high-cost price structure may inhibit the development of minced croaker products if hand labor is required to scale, head, and gut fish. The development of an efficient

laborsaving machine for these tasks is a prerequisite to the establishment of a viable minced-flesh industry for croaker.

Market development

Croaker has been regarded as a low-grade fish and does not have the consumer appeal as that of other species. Retail merchandising is a problem area. Food store personnel do not have the handling technique and also give low status to fish.

A university study for the western Gulf of Mexico which covered the marketability of incidental catches concluded that fish products derived from discards were affected by competing products in the larger markets of which they were a part. But many product markets will easily absorb products processed from discard-type fish.

EFFECTS OF A 200-MILE LIMIT ON THE FISHERY

The 200-mile-extended jurisdiction will provide protection for a major part of the croaker fisheries because a large portion of the Gulf of Mexico croaker fishing grounds are in the 12- to 200-mile zone. There is no foreign fishing within this zone.

HERRING-LIKE FISHES

There are many species of coastal pelagic fish found in the Gulf of Mexico and southeast Atlantic. The use of these pelagic stocks is minimal. Several of these species, the clupeoid or herring-like fishes, are considered to have a potential for industrial and foodfish utilization. The species so considered include round herring, thread herring, scaled sardines, spanish sardines, and one or more species of anchovies.

STATUS OF GULF STATES HERRING-LIKE FISHERIES

In 1974 the only reported landings of the herring-like fishes under consideration occurred in one Gulf State--Florida. The species landed, thread herring and spanish sardines, are used as bait in recreational fishing.

OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF HERRING-LIKE FISHERIES

Resource availability

In 1968 a coastal pelagic latent resource potential of 8,337 million pounds was estimated for the Gulf of Mexico. Herrings, sardines, and anchovies were considered to be the

APPENDIX III

species of greatest potential. Recent estimates of stock size for several species in the eastern Gulf of Mexico are shown below. Estimates of potential annual yield were obtained from mean biomass estimates.

Species	Mean biomass estimate (note a) (million pounds)	Estimated maximum sustainable yield (million pounds) (note b) M=0.50	M=0.75	M=1.00
Thread herring	531	133	199	266
Scaled sardines	406	101	152	203
Round herring	836	209	313	417
Aggregate potential yield		443	664	886

[a]Based on 2 or more years of data.

[b]Yields are given for three possible levels of the natural mortality coefficient (M).

No estimate was obtained for spanish sardine biomass, but it is believed to be about 551 million pounds. If the spanish sardine biomass is that amount, it could contribute from 138 to 276 million pounds to the annual yield, raising the total aggregate yield to a maximum of about 1,157 million pounds.

Anchovy stocks in the Gulf were not estimated but are believed to be probably as large as the herring and sardine stocks.

Harvesting capability

NMFS researchers have proposed an automated fishing system they believe will effectively harvest the herring-like resources. This system would be unmanned from harvesting through processing; the only manpower or vessel requirement would be to service and maintain fishing platforms and to offload the processed products.

The proposed system would be based on the unused oil rig platforms as attractors of coastal pelagic fishes. The fish that congregate around and under the platforms would be periodically harvested with the aid of attraction lights and electrical fields. An automatic processing vessel or barge,

with attraction and harvesting equipment installed on it, would pump the fish from the electrical field into onboard automatic processing machinery where the fish would be converted into fishmeal and oil. An alternative to this approach would be to install electrical hardware and automatic processing machinery on the platform itself. Fish would be periodically pumped into automatic processors, and the resulting fishmeal would be stored on the platform to await collection by a shuttle boat.

Thread herring is harvested with purse seines. Research indicates that herring-like fishes can be concentrated for purse seining by using tent devices, submerged three-dimensional structures. Schemes have been proposed to put a string of tents in the water. After the last tent is set out, the fishing vessel would return to the first tent and harvest the schooled fish.

Product development and processing

Establishing herring-like fish fisheries is based largely on the industrial use of these species for fishmeal and oil products. The reduction technology used in the menhaden fishery is sufficient to process the herring-like fish into meals and oils. Although all the species are suitable for such use, a thread herring fishery is seen as a direct complement to the Gulf menhaden fishery. Thread herring yield as much oil, of equivalent quality, as menhaden yield, although at different times of the year. Therefore thread herring harvesting can be phased so as to stabilize the output of the fish oil industry.

The herring-like fish also make good foodfish specialty products--smoked, cured, and pickled fish products and sardine packs.

Marketing potential

Markets currently exist for industrial and edible herring-like fish products. The United States imports large amounts of edible herring-like fish products, including canned anchovies and sardines, and canned, pickled, and smoked herring.

OBSTACLES INHIBITING GROWTH AND DEVELOPMENT

Resource availability

Stock estimates of herring-like fish in the eastern Gulf of Mexico have been made, but studies have not been

conducted for the northern Gulf. Also good data on age structure and mortality rates of the eastern Gulf herring-like stocks needs to be obtained in future research.

Harvesting capability

Thread herring can be taken with purse seines; however, the harvesting of other herring-like fishes have been unsuccessful because their behavior makes capture with standard purse seines ineffective. These fish also avoid midwater and bottom trawls.

When herring are used for fishmeal or fish protein concentrate, they must be harvested inexpensively by capturing large quantities in a relatively short time, close to a processing plant. Various techniques have been tested to locate schools; the most successful has been the use of aircraft with spotter pilots. Although harvesting techniques and gear are inefficient, dockside processing of the catch has evolved to almost total automation. As a result, the cost of acquiring the raw material is the dominant factor controlling the price of the end product.

Product development and processing

A status quo philosophy on the part of the sardine-pack and menhaden industries has contributed to the nondevelopment of herring-like fisheries. There is a feeling that less conservative fishermen are moving into the menhaden industry. This is shown by the industry's recent interest in exploratory fishing for thread herring.

Market development

No obstacles to market development are foreseen as industrial and edible herring-like fish products now find acceptance. An industrial thread herring fishery operated on the west coast of Florida in the 1960s. The thread herring landed were reduced in Florida to fishmeal, oil, and solubles. The industry closed down when Florida prohibited purse-seining.

Management controls

The legal ban on purse seining, except for bait fishing, within 3 leagues of the west Florida coast constrains the redevelopment of herring-like fisheries. The purse seine ban makes it impossible to harvest scaled sardines, and a large part of the thread herring is also inaccessible. Round

herring and much of the spanish sardine resource are located offshore but, as discussed above, may be unavailable to standard purse seining techniques.

EFFECTS OF A 200-MILE LIMIT ON CLUPEOID FISHERIES

This limit is not expected to have an effect on the clupeoid fisheries. Foreign fleets may be allowed to harvest these resources on a rental basis within established quotas.

PROFILES OF THE FISHING INDUSTRY IN SELECTED FOREIGN NATIONS

CANADA

PRESENT SITUATION AND TRENDS IN THE CANADIAN FISHING INDUSTRY

In 1973 Canada's harvest ranked 15th among the world's fishing nations, but only third in value of fish product exports. Almost 70 percent of Canada's fish products are exported, primarily to the United States.

Although the fishing industry provides employment for less than 1 percent of Canada's labor force, in certain sections of the country the industry is a primary employer. The economy of many coastal communities totally depends on the industry.

Throughout most of the 1960s the fishing industry steadily increased its harvest, which reached a high point of over 3.3 billion pounds in 1968. Since 1968, however, the harvest has consistently declined until 1974. Prior to 1974 demand for fish products resulted in higher prices and compensated for lower catches. Preliminary information indicates this was not true in 1974 when the fishing industry suffered an economic crisis with large sections of the industry near economic collapse. As a result, the Government began to study ways to solve problems confronting the industry. The problems were attributed to the following causes:

--Overexploitation of the stocks.

--Overcapacity of vessels and processing facilities.

--Instability of the industry.

--Failings in the market place.

Overexploitation of the offshore stocks, fished by both Canadian and foreign vessels, was held as the main contributing factor in declining catches. Competing Canadian fishermen tried to maximize their catch and stocks became depleted. In addition, international fishing off Canada's coasts, particularly in the Atlantic Ocean, has intensified steadily since the late 1950s.

Because the supply of fish available to Canadian fishermen has dwindled, both the fleet and fish processing facilities are overcapitalized. Moreover, many processing facilities are not located in areas where they could be optimally used and the facilities have not been adapted for

diverse fish processing purposes. The Canadian Government has contributed to overcapitalization through assistance programs for expanding the fishing industry while fish supplies were declining.

The industry also suffers from instability in product prices, material costs, and availability of fish resources. These instabilities have caused steep, and usually unforeseen, fluctuations in earnings and profits. Industry reaction has been to increase capacity to handle the peaks in supply, thus increasing the industry's overcapitalization.

Finally, there is excessive dependence on a single market, fragmented marketing effort, and inconsistent product quality. Sixty percent of all Canadian fish exports and nearly all groundfish exports go to the United States. This great reliance on a single outlet increases the industry's vulnerability to economic fluctuations. The lack of coordinated market effort among Canadian exporters has aggravated the problem. A relatively large number of Canadian companies compete with each other and with companies of other nations for the U.S. market.

Variation in the quality of Canadian fish products has reduced their acceptability to consumers. Because port markets seldom pay higher prices for better quality fish products, fishermen are indifferent to the quality of their harvests. Official dockside inspection of the harvest is generally lacking.

The Canadian Government, through the Ministry of Fisheries, established a committee in 1974 to develop a fisheries rehabilitation policy. The resultant policy was developed in 1975 and led to the planned introduction of 14 programs by 1978. The programs will deal with

--developing and controlling the fleet,

--providing resource information and conservation,

--restructuring the fish processing industry,

--improving product quality and use,

--consolidating marketing efforts, and

--providing income adjustments to economically troubled fishermen.

These programs represent a fundamental redirection in Government policy, including a more direct intervention in the industry.

EFFECTS OF EXTENDED JURISDICTION

Canada has also acted to protect its fish stocks from overfishing by foreign fleets. Recognizing that ratifications of agreements reached at the Law of the Sea Conference, being conducted under U.N. auspices, may take several years, the Minister of State for Fisheries declared Canada's intent to extend its fisheries jurisdiction to 200 miles by January 1, 1977.

Extension of Canada's fisheries jurisdiction will not, by itself, solve the fishing industry's problems. The effect of the 200-mile extension on the Pacific coast will be relatively small because only limited stocks are available within the extended zone. On the Atlantic coast, however, the future zone is of critical importance, especially to the groundfish industry. Even with more controlled fishing, it will take an estimated 3 to 5 years to rebuild some of the depleted stocks.

Although several stocks of major importance to Canada migrate beyond the 200-mile zone, the Government feels that the new zone will adequately protect Canadian fishing interests. The Government believes the stock population located beyond the zone is not sufficient to attract a great deal of foreign fishing.

Canada and the United States currently have an Agreement on Reciprocal Fishing Privileges, initially negotiated in 1970 and renegotiated in 1973. The Agreement provides that each country may commercially fish certain species in the other country's waters. Discussions concerning reciprocity, enforcement, and management, in light of expanded fishing zones, are underway. For those stocks moving between the United States and Canada's 200-mile zones, joint Canadian-American management will be necessary. Precedents for this kind of management exist. For stocks which migrate beyond the 200-mile limit, management problems will be similar to those already existing. Also, the United States and Canada may disagree about the geographical area encompassed by the 200-mile zones. There is more than one method for measuring seaward boundaries and in the past the United States and Canada have advocated opposing methods.

In respect to international fishing commissions, the Canadian Minister for Fisheries announced that Canada remains committed to multilateral cooperation, but views international commissions as serving advisory rather than regulatory roles. For example, Canada intends to accept recommendations of the International Commission for Northwest Atlantic Fisheries for quota allocations of surplus

stocks within its 200-mile zone but is reserving the right to make final decisions. The Commission would continue to set fishing quotas beyond the 200-mile zone.

STRUCTURE OF THE FISHING FLEET

The Canadian fishing fleet totaled 35,528 vessels in 1973. About 81 percent of the vessels were on the Atlantic coast and about 19 percent were on the Pacific coast. The following table shows the number of Canadian vessels of various sizes.

Gross registered tons	Vessels
Under 10	29,640
10 to 24	4,255
25 to 99	1,236
100 and over	397
Total	35,528

As the table illustrates, the fleet is made up primarily of small craft, with over 95 percent of the fleet being less than 25 gross registered tons. These small vessels generally stay within a day's voyage of home port. Canada engages in little distant water fishing.

OWNERSHIP, EMPLOYMENT, AND WAGES

Most fishing vessels are owned and operated by fishermen. Principal exceptions are about 250 larger vessels, generally at least 100-feet long, which are owned by integrated enterprises that catch, process, and trade fish on the Atlantic coast.

In 1973 there were almost 51,000 marine fishermen. Although this total represented a slight increase over 1972, it was down substantially from a 19-year high of over 64,000 fishermen in 1963. About 77 percent of the fishermen were on the Atlantic coast and about 23 percent were on the Pacific coast. In most cases, fishermen had other part-time jobs. Along parts of the Atlantic, for example, it was common for fishermen to also work as farmers and loggers.

The incomes of commercial fishermen tend to be low. However, there are wide variations among regions. On the average, Pacific fishermen receive an annual gross income of

about $12,800 and Atlantic fishermen receive about $5,100. These figures reflect the presence of many part-time and occasional fishermen, especially in the Atlantic region.

Wages are generally based on catch size. Therefore, earnings depend largely on the ability and initiative of the individual, market conditions, and the stocks available for harvesting. Fishermen unions are highly organized on the west coast but much less so on the east coast.

MAJOR FISHING GROUNDS

Except for a high seas tuna fleet, most Canadian marine fishing takes place off the Pacific and Atlantic continental shelves. Over the past 20 years, Atlantic fisheries consistently accounted for the greater share of the harvest. In terms of price per pound, however, the Pacific harvest is more valuable. For example, in each of the 5 years from 1970 to 1974, the Atlantic fisheries accounted for at least 83 percent of the harvest but never for more than 69 percent of total landed value. In 1974 the Atlantic harvest accounted for 85 percent of the total and 63 percent of the landed value.

In both quantity and value, groundfish, especially cod, is the most important specie of fish harvested in the Atlantic. In the Pacific, salmon is by far the most important species in terms of quantity and value.

SIZE AND COMPOSITION OF THE HARVEST

In 1973 Canada's harvest of 2.5 billion pounds was valued at about $300 million. Canada's harvest has been declining since 1968, largely due to over exploitation of the stocks. Preliminary 1974 figures indicate that, unlike previous years, demand for fish products was not high enough to permit price increases to compensate for the lower catches.

The following tables show specie groupings which accounted for 83 percent of the harvest and 78 percent of the value in 1973.

APPENDIX IV

Specie grouping	Quantity (millions of pounds)	Percent of total harvest
Herring	620.6	24
Cod	553.4	22
Redfish	375.9	15
Flounder	314.6	12
Salmon	244.9	10
	2,109.4	83
All others	429.4	17
Total	2,538.8	100

Specie grouping	Value (millions)	Percent of total value
Salmon	$ 95.5	32
Cod	42.8	14
Lobster	40.6	14
Flounder	32.3	11
Herring	21.4	7
	232.6	78
All others	67.4	22
Total	$300.0	100

For each of the 5 years from 1969 through 1973, the species listed accounted for at least 83 percent of total weight and 76 percent of total value of the catch.

PROCESSING FACILITIES

In 1973 there were about 650 fisheries plants in Canada. About one-half of the plants were processing fish and the remainder were packing plants and facilities where fish did not undergo a change of form (e.g., fresh to canned). The processing industry employed about 21,000 people in 1973. Most of the processing plants were small; 70 percent employed less than 50 people and only 1 percent employed more than 500 people.

The groundfish processing industry of the Atlantic coast is the major employer for Atlantic Coast fisheries but is quite fragmented resulting in inefficient operations. Vessels based at 2,000 locations deliver groundfish to over 1,000 landing points which then send the fish to more than 300 plants. Many of these plants are merely collection stations which partly process fish for delivery to larger plants. Generally, the groundfish processing plants are small, supply only frozen fish, and are subject to restricted periods of operations. Some plants operate less than 5 months of a year. Because of this only about one-half of the annual groundfish production capacity of 750 million pounds is currently being used.

The groundfish processing plants are owned by about 120 private companies. Twelve of these companies own 50 processing plants which account for about 80 percent of Canada's fresh and frozen groundfish production and 45 percent of the total fish production on the Atlantic coast.

Competition is keen among Canadian processing companies exporting fish products to foreign markets. For example, 80 companies compete for the U.S. groundfish market and 30 companies compete for a very small part of the U.S. crabmeat market. Moreover, efforts to develop export markets have been sporadic and uncoordinated. For these reasons, by 1975 many companies faced imminent bankruptcy and appealed for Government assistance.

DOMESTIC USE OF FISH PRODUCTS

Preliminary 1974 figures indicate Canada used 87 percent of its catch for human consumption and 13 percent principally for oil and fishmeal. Most fish used for food was processed in a frozen form as shown in the following table.

Type of fish product	Percent of total
Frozen	53
Fresh	21
Cured	16
Canned	10
Total	100

Between 70 and 80 percent of the catch generally was used for human consumption during the years between 1955 and 1969. Beginning in 1970 the portion used for food steadily increased to the 1974 level of 87 percent--largely because the use of frozen fish increased. Annual per capita consumption of fish products has remained at about 12 pounds since at least the 1940s. Sales promotion and the introduction of new products have shifted consumer preference for different types of fish products but have not raised per capita demand. Consumption is highest in shoreline and urban areas, suggesting that proximity to water or a fish shop influences the amount of fish consumed. The products in greatest demand are tuna and groundfish fillets and blocks.

The price of fish increased by 277 percent between 1957 and 1974. There were wide variations in the annual rates of price change, ranging from a 3-percent decrease to a 32-percent increase.

IMPORTS AND EXPORTS

Canadian fish products satisfy about 70 percent of the domestic demand. The balance in demand is provided by imports of species not found in great abundance in Canadian waters, particularly shrimp and tuna.

Imports have been steadily increasing, reaching a value of $109.2 million in 1973. This represents an increase of 183 percent from 1969. In 1973 the United States and Japan supplied almost three-quarters of Canadian imports. Shrimp from the United States and tuna from Japan were the primary imports. Over 90 percent of the imports were fresh, frozen, or canned.

Canada is one of the world's major fish product exporters, ranking third in value exported and fourth in quantity exported in 1973. Nearly 70 percent of Canada's fish products are exported. The value of the exports reached a high point of $490.7 million in 1973 but declined by 12 percent in 1974 to $440.1 million.

In 1973 59 percent of Canada's exports went to the United States. The major products exported to the United States were groundfish and lobster. Japan and the United Kingdom each accounted for 11 percent of Canada's exports. The primary product exported to Japan was fish roe. Salmon was the chief export to the United Kingdom.

The high reliance on the U.S. market for exports increases the Canadian industry's vulnerability to price

fluctuations. For example, Canadian groundfish prices declined in 1973 because of market conditions in the United States. Between 1969 and 1974 the Canadian groundfish industry has lost a large portion of the U.S. market. Sales of groundfish blocks declined from 33 percent to 12 percent of the U.S. market and sales of groundfish fillets declined from 74 percent to 48 percent.

ECONOMIC ROLE OF THE FISHING INDUSTRY

The Canadian fishing industry provides job opportunities in regions which offer little alternative employment and is a valuable source of foreign exchange. It also provides a source of protein to Canadian consumers.

The industry contributes less than 1 percent to Canada's total employment but is extremely important in certain communities. About 75 percent of the communities in Atlantic coast provinces engage in commercial fishing and, of these communities, some 20 percent have no other economic base. To a lesser extent, many isolated communities on the Pacific coast depend on fishing and fish-related industries.

Fish exports generally have increased faster than imports since 1964 contributing to a growing balance of trade surplus for fish products. In 1973 exports exceeded imports by $381.5 million.

Canada, like the United States, relies mostly on non-fish products for its protein supply. Seafood consumption represents about 5 percent of the combined meat and poultry consumption.

GOVERNMENT ROLE IN FISHERIES

Over the past few years, the Canadian Government has taken a more active role in managing the fishing industry. The Canadian Federal Government has legislative jurisdiction over its fisheries. The Government has been and will continue to be involved in all aspects of industry operations, such as controlling the harvest, restructuring the fleet and processing plants, and planning for the management of an extended fisheries zone under Canadian jurisdiction.

Policy aims

In 1975 the Minister of State for Fisheries presented to the Government an overall plan for managing and developing fisheries. The plan has now been adopted as Government policy and has become a guide for rebuilding Canada's commercial fisheries over the next 10 years.

The strategies in the plan have a common aim--the creation of a climate of prosperity and security for all who participate in commercial fishing. There are two major shifts in policy. First, the guiding principle in fishery management no longer will be the protection of fish, but the best use of society's resources. "Best use" is defined as the sum of net social benefits, such as personal income, occupational opportunity, and consumer satisfaction. Second, fundamental decisions about resource management and industry and trade development will be reached jointly by industry and Government.

Fisheries agency

The Fisheries and Marine Service, one of the two principal components of the Department of the Environment, has had total responsibility for fisheries management and research since it was established in January 1973. The importance of the Fisheries and Marine Service was evidenced by the appointment of a Minister of State for Fisheries in 1974 to serve as its informal head and as a spokesman for the fishing industry. The Minister for Fisheries is assisted by a Senior Assistant Deputy Minister who serves as the operational head of the Service with a staff of about 5,500.

The fiscal year 1976-77 budget of about $267 million[1/] represents a 25-percent increase over the fiscal year 1975-76 budget. Although the budget represents about one-half of the Department of the Environment's budget it was less than 1 percent of the total Government budget.

Support programs

The Canadian Government has provided subsidies for fishing vessel construction since 1944. A 1970 Government report stated that subsidies had led to a rapid expansion in the number of vessels of 25 gross registered tons or larger and to increased harvests and processing capabilities. The report also said that the subsidies contributed to an overinvestment in fishing and processing capabilities.

In 1970 and again in 1973 more selective subsidy policies were provided. In 1975 a short-term policy was introduced making subsidies available primarily to vessels which will replace existing vessels. Under the new policy, the Government will pay 35 percent of the cost of any eligible

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[1/] The Canadian fiscal year is from April 1 to March 31.

fishing vessel at least 35 feet in length. Provincial governments also provide subsidies and loans of varying amounts for vessel construction. In fiscal year 1973-74, the Fisheries and Marine Service paid about $9 million in subsidies for about 456 vessels. Another $5 million was paid in fiscal year 1974-75 for about 269 vessels.

The Fishing Vessel Insurance Plan provides coverage for fishing vessels at below-market interest rates. In fiscal year 1974-75, about 8,000 vessels were insured under this plan. Revenues from premiums as of April 1976 exceeded claims by about $4 million.

The Fish Chilling Assistance Program came into effect in 1973. The objective of this program is to minimize fish deterioration by providing assistance for additional ice-making and ice-storage facilities at processing plants and for refrigeration on fishing vessels. Assistance amounting to 50 percent of cost, not to exceed $25,500 for any one facility, is provided. The cost of approved installations totaled about $2 million as of March 31, 1975.

The Fisheries Prices Support Board, under the Fisheries and Marine Service, is designed to protect fishermen against sharp declines in prices and consequent loss of income due to causes beyond the control of the fishermen or the industry. The Board has a working capital fund of about $25 million to support prices of fishery products when there is a decline. Several programs have provided assistance to alleviate severely depressed market conditions.

In the fall of 1974, the Government spent about $15 million in an initial attempt to assist the fishing industry by providing working capital loans and assistance for inventory financing and product promotion. An additional $20 million was authorized in December 1974 to keep the groundfish industry in operation during the winter months by (1) partially offsetting rapidly rising costs for fishermen and (2) assisting processors in keeping plants operational. This program terminated on April 30, 1975. On May 1, 1975, a new $51 million subsidy program went into effect. Its major components were as follows:

--Support to groundfish fishermen owning vessels and landing high-quality fish ($29 million).

--Assistance to processing plants which maintain July 1, 1974, prices for fishermen ($12 million).

--Assistance to help solve marketing problems encountered by segments of the industry ($10 million).

In March 1976 the Minister for Fisheries announced that the assistance program would continue in fiscal year 1976-77 with authorized funding of $44 million.

The Canadian Government does not rely on foreign assistance to support its fisheries programs.

Research programs

According to a Fisheries and Marine Service official, the nature of Government research has changed over the past several years. The thrust has changed from descriptive research, such as data gathering, to applied research which can be put to practical use. Emphasis is placed on interrelationships among fish stocks.

Fishery research is conducted to obtain information needed for effectively developing and managing fisheries resources and for providing aquatic life forms with a biologically suitable environment. Recent projects have included investigations in groundfish rehabilitation, market assessment of underutilized species such as capelin, and the development of technology required for aquaculture programs. Data obtained is provided to international commissions which manage common property fisheries resources.

According to a Fisheries and Marine Service official, there are four major laboratories conducting biological research and two conducting marketing research. The Service also operates a substantial fleet of about 660 vessels which support fisheries research, protection, and survey programs. Additionally, vessels from foreign countries are chartered to do research on new fishing techniques. The cost of all vessel operations is about $38 million annually.

Management programs

The Fisheries and Marine Service attempts to manage fish stocks by controlling levels of fishing effort rather than by establishing specific harvest limits. The Service attempts to limit fleet size to keep it at a level commensurate with fish stocks available. In the late 1960s, Canada first introduced legislation to limit fishing licenses in two specialized fisheries--the Atlantic coast lobster fishery and the Pacific coast salmon fishery. The lobster limitation program was introduced in two regions of the Maritime Provinces in 1967 when a higher limit was placed on the number of operators that could participate in each region. The

limitation on operators was extended to all parts of the Maritime Provinces in 1968. In 1969 regulations were changed to place the maximum limit on the number of vessels, not operators. The change was intended to reduce the number of participants in the lobster industry by eliminating vessels which use less than a specified number of lobster traps.

The salmon limitation program was initiated in 1969 and called for salmon vessels to be grouped into two categories based on production levels for the 2 previous years. Only the category of vessels having the higher production can be replaced. Through attrition, therefore, vessels with lower production will be eliminated from the salmon fishery. Also, salmon vessel license fees were increased sharply. In 1970 a new restriction was imposed requiring that vessel replacements be on a ton-for-ton basis instead of a boat-for-boat basis.

Until 1968 the number of vessels equipped and licensed for Pacific salmon fishing remained fairly constant (7,200 to 7,600 vessels). After the introduction of the license control program, the number of licensed vessels dropped steadily to 5,890 in 1972.

According to a Fisheries and Marine Service official, limited entry programs are now in effect for all but the underutilized fisheries. The programs are intended to lead to greater catch per vessel and greater earning capacity for the fleet.

Another feature of a limited entry program is the possible use of revenues generated from issuance of licenses to buy back vessels from fishermen, resulting in a reduction in the number of fishermen. For example, a "buy-back" program was begun in the British Columbia salmon fishery in 1971. Purchased vessels are auctioned with the provision that they may not be used for fishing in British Columbia waters.

Level of effort is also controlled by regulating gear, fish size, catch limits, and length of seasons, but, according to Government officials, these regulations are not relied upon as much as eligibility requirements for fleet entry.

Government regulations do not permit Canada to enter into joint ventures with foreign nations; but Canada participated in 11 international fisheries commissions and 10 bilateral agreements. Conservation efforts through these international agreements, however, have not fully protected Canadian offshore waters from overfishing by foreign fishermen.

In 1974 protection of Canada's fishery resource was expanded with increased surveillance of Canadian and foreign fishing activities. New fishing patrol vessel construction was begun to provide additional specially designed and equipped vessels for offshore patrol duties. Also, the Canadian Navy's mission has been expanded to include offshore surveillance of fishing vessels. The Navy has the authority to board and inspect vessels. The Navy also provides some aerial surveillance of foreign fishing activity to assess its extent.

Additional protection of Canada's fisheries is provided by the International Commission for Northwest Atlantic Fisheries. In 1974, through the Commission, there were over 200 boardings of foreign fishing vessels.

The government's Fisheries and Marine Service has the statutory obligation to insure production of safe, good quality, and properly identified fishing products. Standards are set for safety, wholesomeness, grading, and labeling. In 1974 some 950 fish processing operations producing products for interprovincial and international use were registered by the Service. All registered plants are subjected to frequent inspection and periodic in-depth examinations of particular aspects of processing. Imported fishery products are inspected at entry ports but there is generally no dockside inspection of domestic fish harvests.

Fishery trade policies

According to a government official, Canada does little to restrict imports. Several programs are conducted by the government to increase Canadian fish exports. These programs are for

--arranging trade fairs, conventions, and missions in other countries;

--participating in the North Atlantic Seafood Association;

--forecasting the market outlook for fish products, particularly groundfish in select foreign countries; and

--assessing the market for underutilized species, such as capelin and mackerel.

DENMARK

PRESENT SITUATION AND TRENDS IN THE DANISH FISHING INDUSTRY

Denmark experienced a 25-percent increase in total landings in 1974, the bulk of the catch being used for industrial purposes. After a decade of rapid expansion in harvesting the Danish fishing industry is nearing a stage where emphasis will be on consolidation rather than further expansion.

Quota restrictions, particularly in the North Sea involving industrial products, are having an effect on raw material resources. Other considerations such as higher operating costs, higher fish prices, and the added emphasis placed on conservation of fishery resources have resulted in slowing down the expansion of the fishing industry.

EFFECTS OF EXTENDED JURISDICTION

The future of the Danish fishing industry will in part be shaped by the outcome of (1) European Economic Community (EEC) fishing zones and (2) implementing a worldwide 200-mile fishing zone.

Up to 50 percent of Denmark's catch is taken from areas that could be lost to the jurisdiction of other EEC states and Norway. There is optimism, however, that an acceptable solution will be found within the context of an overall EEC fishery zone.

Danish government officials have stated a preference for a smaller territorial limit than 200 miles, say 50 to 100 miles. Denmark's primary concern is protection of her traditional fishing areas. Denmark should not be affected by a U.S. 200-mile limit because effective January 1, 1976, Danish fishing for salmon ceased off the U.S. coast when high operating costs made this effort nonprofitable.

STRUCTURE OF THE FISHING FLEET

The Danish fishing fleet is largely composed of small, aged vessels. In number, the fleet has grown smaller by some 20 percent during the last decade. Its overall harvesting capability, however, has increased by using larger more modern vessels.

The trend is toward larger, motorized vessels used principally in the fish reduction industry. Fish reduction is the processing of fish to produce fish meal and oil.

Denmark's fishing vessels with engines

Gross registered tonnage	Number	
	1973	1974
0-50	6,683	6,822
51-150	379	399
151-500	61	96
Total	7,123	7,317

Denmark also has a large number of small, motorless coastal vessels. The number of boats in this fleet decreased by about 200 between 1973 and 1974.

Generally, the larger vessels are the newer and more modern ships. Twelve new vessels of the 151-500 tonnage group were completed during 1974. The age of the smaller boats extends up to 40 years.

OWNERSHIP, EMPLOYMENT AND WAGES

Two-thirds of the Danish fleet is owned and operated by individual or family enterprises. These vessels constitute the in-shore fishing fleet. Most of the larger vessels, especially those used for industrial purposes, are company owned.

The number of Danish fishermen has increased slightly from 14,691 since 1972 to 15,200 in 1974. About 4,000 of these are part-time fishermen. Although total fishermen are increasing, fewer young people are entering the fishing industry. The average age of the Danish fishermen is 50 years.

The fishing industry is not unionized. Pressure to do so has failed. Instead, the Government has two organizational bodies on the east and west coasts who set fishing policy. Wages paid to fishermen are usually a share of the net proceeds derived from the catch.

MAJOR FISHING AREA

The North Sea is the most important fishing area for Danish fishermen accounting for 78 percent of the 1974 fish catch. The North Atlantic, including the waters off

Greenland, accounts for the other 22 percent. Danish fishermen no longer fish for salmon off the U.S. coast as high operating costs have made this operation unprofitable.

SIZE AND COMPOSITION OF THE HARVEST

Since 1970 the Danish fish catch has increased from 2.6 billion pounds in 1970 to 4.0 billion pounds in 1974. The value of the catch has more than doubled from $101 million[1/] in 1970 to $256 million in 1974. The expansion is primarily attributable to the increased number of fish caught for industrial purposes, made possible by improvements in fishing methods.

The 1974 Danish catch consisted of 293.2 million pounds of cod, 77.2 million pounds of plaice, 70.5 million pounds of mussels, 52.9 million pounds of herring, and 3.3 billion pounds of miscellaneous species to be used for reduction purposes.

In addition to the above, foreign fishermen landed approximately 348.3 million pounds of fish in Denmark, valued at $41 million, which were caught off Denmark's coastal waters.

PROCESSING FACILITIES

The Danish fishing industry adopted the common grading system after EEC entry. This was facilitated by legislation and by the surveillance of the Fisheries Inspectorate. The introduction of special legislation with sanctions of fine or imprisonment also aided the rapid adoption of the Common Fisheries Policy in grading. The widespread Fisheries Inspectorate made surveillance and compliance a relatively simple matter.

While there was little enthusiasm among processors for the grading regulations, the Danish industry is used to stringent quality controls. Throughout all their operations regulations govern the construction of their plants, the bleeding and boxing of fish, and the conditions and form of the final product, particularly when they are destined for

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[1/] For consistency, we selected the following conversion rates and applied them throughout the Denmark profile.

1970	$1 = 7.50 Kroner	1973	$1 = 6.05 Kroner
1971	$1 = 6.98 Kroner	1974	$1 = 6.09 Kroner
1972	$1 = 6.85 Kroner		

the export market. Quality controls, including licenses issued to processors, are issued by the Fisheries Ministry.

Fish processing facilities in Denmark range from small individually owned firms to large multimillion-dollar factories. The majority of the larger factories are used for producing fishmeal and oil. A large percentage of these facilities are foreign owned as the Danish Government maintains a liberal attitude toward foreign ownership of fish-processing plants in Denmark.

Cooperatives are an important factor in the Danish fish-processing plants. Membership in these organizations can range from a couple of small private firms to several hundred. One cooperative near Copenhagen has 40 processing firms each employing from 3 to 30 people. It has been in operation for 10 years and leases its land from the Government for a 75-year period. All members of this cooperative are engaged in producing finished fish products (smoked fish, fish cakes, herring, etc.). None are involved in catching fish. Several unions are represented; for example, the fish packers belong to one and transporters to another.

The cooperative processed-fish products were valued about $56 million in 1974. Less than 10 percent of the processed fish goes to exports. Most is sold to fish markets, stores, and restaurants in the Copenhagen area. The Danish Government inspects the cooperative at least once a year. It checks and records such things as where the fish were caught, their size, and sanitation conditions.

Within the cooperative the average salary is about $220 per week. The average fish cleaner (union member) earns about $150 per week. An incentive system exists for most processors. Several workers function as a team and receive a bonus measured upon the number of fish they are able to process. Team pressure improves performance.

DOMESTIC USE OF FISH PRODUCTS

Edible fish is consumed principally in fresh form, but an increasing amount is being processed into frozen fillets, canned, cured, and smoked products. More than 80 percent of the Danish catch is used for nonfood purposes, principally fish meal and oil of which about 61 percent is exported.

Domestic consumption is high, about 70.2 pounds a year per person in 1974, about 50 percent higher than the average for Western Europe. Notable among the domestic food fish consumed are shrimp, salmon, and cod. Danish-caught supplies

of fish are supplemented by substantial imports of fresh, frozen, canned, and salted products. Present trends in the pattern of domestic purchase--increased sales through supermarkets and growing sales of frozen fish--are likely to continue.

Fishermen prospered as prices paid for cod rose from an annual average of 7.6 cents a pound in 1970 to 20.8 cents a pound in 1974.

Most fish caught by Danish fishermen are sold to wholesalers at public auctions. The fish auction markets work within the EEC minimum price system. Thus, if a catch of cod, haddock, or other included species fails to bring the minimum price, it is withdrawn from human consumption and used for meal and the fishermen member of the producer organization receives the minimum price. Prices paid for fish used in the reduction process are negotiated periodically between fishermen and processors.

The average monthly price for reduction fish has dropped sharply from 4.8 cents a pound in February 1974 to 3 cents a pound in March 1975. The 1.8 cent fall in prices for reduction fish and for fish meal resulted chiefly from the large world production. World production of fish meal, which had surpassed 11.0 billion pounds in both 1970 and 1971, decreased to 9.3 billion pounds in 1972 and to 8.2 billion pounds in 1973, primarily as a result of the drastic decline in the catch of Peruvian anchoveta. However, in early 1974, fish meal production increased as the anchoveta returned, and the prices for animal feed grains, including fish, declined.

IMPORTS AND EXPORTS

Denmark is a member of the EEC and abides by all import/export policies within the community. Danish imports of fishery products are valued at $140 million. Herring, shrimp, and salmon were the most important species in terms of value. About half the imports were direct landings of fish from foreign fishing vessels. Herring accounted for 196.2 million pounds out of the 348.3 million pounds landed by such vessels.

In 1974, the total fish supply including imports was estimated at more than 4.6 billion pounds. Only 25 percent was consumed within Denmark itself while 75 percent was exported. Denmark is the largest exporter of fish and fishery products in the EEC.

Utilization and Composition of Danish Fish Supply - 1974

	Catch	Imports	Total supply	Exports	Available for domestic consumption	Percent of domestic consumption
	(million pounds)					
Available for human consumption	659	369	1,028	672	356	35
Animal feed and other purposes	3,386	255	3,641	2,835	806	22
Total	4,045	624	4,669	3,507	1,162	25

Danish fishery exports in 1974 increased by 6 percent in weight and 14 percent in value over 1973 figures. The 1974 data is shown below by commodity.1/

Denmark's Fish and Shellfish Exports - 1974

Commodity	Pounds (Thousands)	U.S. dollars
Fresh or frozen:		
Cod, except fillets	42,216	$ 19,290,968
Cod, fillets and blocks	75,007	53,729,720
Codlike species, fillets and blocks	14,513	7,684,729
Flatfish fillets	17,668	17,211,330
Eels	8,104	13,434,646
Herring, whole	50,840	10,286,371
Herring, fillets	97,961	27,839,737
Pond trout	25,529	25,131,198
Salmon	5,033	7,880,623
Total	336,871	182,489,322
Fish meal	546,512	115,514,610
Fish oil	163,456	36,642,528
Other products	328,186	115,230,040
Total	1,375,025	$449,876,500

1/ World prices for most exports continued at high levels during most of 1974. Prices received for fish oil were more than twice those received during 1973. However, prices for cod and fish for reduction to animal feed dropped sharply in early 1975.

The principal destination for Danish fishery products in 1974 continued to be other EEC member states. Sweden, the United States, and Switzerland were important markets although the percentage imported by the first two nations declined from that of the previous year.

Denmark's Exports by Major Markets - 1974

Market area	Quantity		Value	
	Pounds	Percent	U.S. dollars	Percent
EEC	826,460	60	$259,059,770	57
Sweden	156,630	11	48,269,280	11
Switzerland	48,298	4	24,880,620	6
United States	45,962	3	30,925,451	7
Other countries	297,675	22	86,741,379	19
Total	1,375,025	100	$449,876,500	100

ECONOMIC ROLE OF THE FISHING INDUSTRY

According to Danish government officials the fishing industry accounted for about 2 percent of the total Danish gross national product for 1975. It makes a valuable contribution to domestic supplies of food and plays an important role in the nation's international trade.

During recent years 4 to 5 percent of Denmark's total merchandise exports have consisted of fish and fish products which in 1974 were valued at $486 million. This represented a threefold increase over 1970. Spinoff industries have benefited, such as the engine and pump manufacturers and the fishing gear and equipment industries. For example, a new hydraulic winch arrangement for side and stern trawlings was developed.

Fisheries make a major contribution to the local economies in some coastal and sparsely populated areas where few employment possibilities other than agriculture or fishing are available.

GOVERNMENT ROLE IN FISHERIES AND FISH CONSERVATION

The Danish government does not normally interfere directly in the fishing industry. It encourages fishing in general and has helped to create an environment in which the modernization of the fishing fleet, especially by the introduction of larger and better equipped vessels, has been able to take place. The Government also has always shown great interest in securing as far as possible free access to

foreign markets for the country's fishery products and in co-operating in international efforts to secure the conservation and management of important resources to the Danish fishing industry.

Denmark participates in fishery commissions such as the Northeast Atlantic Fisheries Commission (NEAFC) and the International Commission for Northwest Atlantic Fisheries which approve total allowable catch quotas for fish stocks and fishing areas. The Danish government abides by the commissions' recommendations.

The Ministry of Fishing is small compared to other government ministries and has an annual budget of about $6.8 million. It employs between 200 and 300 people. About 60 of these are located in Copenhagen handling policy and administrative functions and about 110 are involved with such tasks as fishery inspections, quota handling, and fish distribution.

A considerable amount of scientific and technical research is carried out under the auspices of the Ministry of Fisheries. Marine biological investigations are concentrated principally on waters exploited by Danish fishermen (the North Sea and the Baltic). Investigations on the state of the stocks, the growth, as well as the hydrographical and physiological conditions are undertaken regularly. Two research vessels are permanently engaged in such pursuits and there is a land-based research laboratory. Research is also directed towards the technology of processing fish for human and animal consumption, and costs and earnings investigations are regularly undertaken in all sectors of the fishing fleet.

Government assistance

The Danes are not eligible to benefit from EEC industrial project grants under the existing forms of EEC structural aid.

Indirect Danish subsidies do exist in the form of government-supported bank loans. Bonds are sold on the open market to create funds to be loaned by banks to certain sectors of the fishing industry at better than normal rates.

During the financial year 1973-74, the Royal Danish Fishery Bank granted loans totaling about $16 million chiefly for construction of new fishing vessels. These loans are not paid in cash but in State guaranteed bonds. The 1974 rate of exchange of these bonds was 9 percent and the repayment period is from 10 to 15 years. Fifteen percent of the end-use costs are to be covered by the borrower.

While most of the loans go toward construction of new craft or the modernization of existing vessels, there are loans to modernize and expand the processing industry as well. The money can be used to cover 65 percent of building costs or up to 50 percent of machinery costs. The repayment period is 15 years for buildings and 10 years for machinery.

The economic difficulties in the fishing industry which began in late 1974 brought numerous requests for Government assistance from the usually independent Danish fishermen and processors. Among the measures requested were fuel and gear subsidies, the extension of loans and delay in loan payments, interest assistance, and minimum prices for fish. Under an EEC decision permitting member states to pay fuel subsidies the Danish parliament approved about $1.15 million for fuel subsidies for the quarter April 1 through June 30, 1975.

In March 1975 the Government was instrumental in securing EEC approval of a temporary subsidy for the exportation of cod and saithe.

The Danish government also contributed to the financing of a marketing scheme to promote the U.S. consumption of North Atlantic groundfish (cod, haddock, pollock, hake, and ocean perch). The other participants in this scheme were Canada, Iceland, and Norway, which together with Denmark account for nearly all North Atlantic groundfish products imported by the United States.

Conservation of fish stocks

Denmark has been regarded as a stumbling block to conservation measures proposed by the NEAFC. One example of this was the Danish harvest of immature herring for industrial purposes in the North Sea. NEAFC attempted to limit the total catch of herring from the North Sea. The Danes opposed the proposal insisting on a larger individual share of any total quota. It was not until July 1, 1974, that a quota agreement was reached. This agreement allowed an international catch of 1.1 billion pounds, with Denmark getting the biggest quota of 463.0 million pounds. Norway was second with 220.5 million pounds. The agreement was scheduled to last until July 1975.

In August 1975 the Danes filed objections with NEAFC on the issues of herring quotas and minimum mesh sizes. They found their quota of herring unacceptable at 152.1 million pounds. By November 1975 it was recommended that the direct

fishing of North Sea herring be banned in 1976. Denmark responded and banned herring fishing in the North Sea. It appears that the Danish government although not particularly concerned with conservation programs is slowly abiding by the recommendations of the fishery commission.

JAPAN

PRESENT SITUATION AND TRENDS IN THE JAPANESE FISHING INDUSTRY

Japan's 1974 fish catch of 23.8 billion pounds, a 16 percent increase over 1970, was the largest in its history. The value of the catch increased 81 percent from $3.2 billion in 1970 to $5.8 billion in 1974, but, because of spiraling costs, increased foreign competition, slackened demand, and other factors, the profitability of Japan's fishing industries has plummeted. The net profit of small fishing companies on sales decreased from an average of 8.4 percent in 1973 to 2.6 percent in 1974. The medium and large size companies lost money in 1974, with the large companies having average losses of $5 million.

Japan's heavy reliance on offshore and distant water fishing is shown by the following table.

	1974 production	
Type of fishery	Quantity (note a)	Percent of total
Coastal fisheries	4,122.6	17.3
Offshore fisheries	9,221.8	38.7
Distant water fisheries	8,148.2	34.2
Inland water fisheries and cultures	394.6	1.7
Marine cultures	1,940.0	8.1
Total	23,827.2	100.0

[a] Expressed in millions of pounds.

Japan categorizes its marine fisheries by vessel size and trip duration. Coastal fisheries include (1) firms without boats and (2) firms using vessels of less than 10 gross registered tons which leave and return to port within 24 hours. Offshore fisheries include firms using vessels from 10 to 1,000 gross tons, except those vessels making trips of 7 days or more, which are categorized as distant water fisheries (generally 20 gross tons or more). The

number of Japanese marine fishing firms (about 230,000) has remained fairly stable over the last 5 years, with the majority being the small coastal and inland water fisheries.

Greatly increased fishing costs and impending sanctions of international economic zones have forced both industry and Government to take steps to stabilize its fishing operations.

Officials of two major fishing firms told us that they have undergone drastic reorganizations, were reducing certain fleet operations, closing processing plants and were taking other measures to overcome the increased costs and impending sanctions. Increased costs have made the operation of factoryships, ships which process the catch at sea, uneconomical in some areas and, as a result, most fish is brought to Japan in frozen form. The large distant water fishing companies realize that their international fishing operations may be confined to a smaller scale in the near future (see p. 312), and are diversifying into other sectors of fishing activities. One company has made advances in the area of aquaculture to help overcome its supply problems and another is placing more emphasis on imports and reprocessing activities.

As of March 31, 1975, the Japan Fisheries Agency reported 169 joint ventures in 50 countries, with a total investment value of $78 million ($27 million in North America). Japanese investment, in the form of capital, technical assistance (manpower) and in-kind contributions of vessels, machinery, and gear, is made primarily to secure a source of fish and fish byproducts in some ventures for the companies involved. An Agency official said that recently, the trend has been to strengthen existing joint ventures, rather than to establish new ones. This may be attributed to the weakened financial condition of Japan's fishing industries.

Joint ventures involving actual fishing operations require clearance from the Government. The Agency and the Department of the Treasury screen all such ventures to insure that they are in accordance with foreign policy. The Overseas Fishery Cooperation Foundation, funded by the Agency, provides low interest loans to Japanese companies establishing joint ventures in developing countries.

The Japanese Government has recently instituted a number of programs to help its fishing industries. Subsidized long-term, low-interest loan programs have been established to liquidate fishing companies' debt burdens, reduce the size of the tuna fleet, to relieve overcapacity,

and to help companies cope with high fuel costs. A similar loan program, aimed at stabilizing domestic fish prices will be started in October 1976. Another assistance program, approved in April 1976, provides for the maintenance and development of Japan's coastal fishing grounds. The program, to be carried out over the next 7 years, will cost an estimated $667 million.

EFFECT OF EXTENDED JURISDICTION

The establishment of global 200-mile economic zones is a highly sensitive issue in Japan. Next to Iceland, Japan has the highest annual per capita consumption of fish and shellfish in the world--80.2 pounds, or over 50 percent of its total animal protein intake. With coastal and inland fisheries and cultures contributing less than 30 percent of its total fishing catch, international fishing grounds are vital to the welfare of its fishing industry. About 9.9 billion pounds, or over 40 percent of its 1974 fishing catch, with a value of $1.7 billion, came from waters within 200 miles of foreign countries.

The Japanese are resigned to the establishment of worldwide 200-mile economic zones, by the United Nations' Law of the Sea Conference. They are, however, strongly opposed to countries taking unilateral actions establishing 200-mile economic or fishing zones, as the U.S. and Canada have done. They are also opposed to the idea of coastal countries being granted the right to exclusive control over resources in areas exceeding 200 miles from the coast (continental shelf resources).

The Japanese Government has publicly stated that the primary objective of its fishing industry is to maintain, and if possible, increase its total fishery catch. Although it is not yet clear how Japan will deal with the problems imposed by the creation of worldwide fishing zones our observations are that:

--Japan's 7-year coastal fisheries development program plans to increase coastal fishery production by about 660 million pounds or 10 percent of recent production.

--Research programs are being conducted to locate new fishing grounds, develop uses for underutilized species including Antarctic krill and deep sea fish, and to promote the more effective utilization of currently used species. An approach under consideration is to grant development assistance and other concessions to lesser developed countries in return

for use of their fishing grounds. Japan's main approach, however, will probably be through bilateral negotiations for rights to fish off of foreign countries' waters, striving for large quotas based on past level of catches.

The recent U.S. legislation which established a 200-mile fishery conservation zone, beginning March 1, 1977, has gravely upset the Japanese Government. They perceived the U.S. position as favoring the multilateral approach at the Law of the Sea Conference. They considered the action as excessively severe, asserting that the restrictions imposed could seriously affect the country's food policy and the relations between the United States and Japan.

Japan catches about 3,307 million pounds of fish, or one-seventh of its total catch in waters off the United States, almost all coming from the Bering Sea and Northeast Pacific Ocean. Alaskan pollock and bottomfish account for 2,866 million pounds of their catch, with tanner crab, rockfish, blackcod and squid making up the rest.

One possible method to reduce Japan's supply problems was shown by a recent commercial joint venture proposal, whereby U.S. fishermen would catch Alaskan pollock for delivery to Japanese processing vessels. NMFS analyzed the proposal finding no legal objection to the plan. NMFS also believed that such a venture could benefit the development of a U.S. bottomfish industry.

Depending heavily on the sea for a source of food, Japan advocates international cooperation for the conservation of marine resources. Japan participates in 13 regional fisheries commissions for this purpose. In recent years, Japan has joined the Inter-American Tropical Tuna Convention (1970), the Atlantic Tuna Convention (1969), the Northwest Atlantic Fisheries Convention (1970), and the International Convention for the Southeast Atlantic Fisheries (1971).

STRUCTURE OF THE FISHING FLEET

Japan's marine fishing fleet of more than 372,000 vessels consists of about 2.7 million gross registered tons. Although powered and nonpowered boats of less than 5 gross tons make up over 90 percent of the fleet, they account for only 20 percent of its gross weight. Larger vessels of 100 tons and up, less than 1 percent of the fleet, account for over half of its gross weight. Recent changes in the fleet mainly involved the replacement of nonpowered vessels with powered ones in the less than 5 gross tons category.

Japan's fleet has overcapacity problems. Government and industry plans call for a 20 percent reduction of Japan's pelagic tuna fleet over the next 3 years. An official of one of Japan's major distant water fishing companies said it has reduced the size of its fleets in certain areas and that some vessels are sitting in harbors, owing to their uneconomic operation.

There is no generally accepted indicator to measure the productivity of fishing fleets. However, one indicator used by NMFS is the ratio between harvest and vessel tonnage. Using this indicator, NMFS showed that of the five nations having the largest fishing fleets, the Japanese fleet ranks third in productivity as shown in the following table.

Country	Harvest (pounds harvested per gross ton of vessel)
Norway	32,628
United States	16,645
Japan	15,609
Spain	6,900
Soviet Union	2,910

Japan's productivity level is largely attributable to the fact that nearly all vessels in the fleet are engaged in harvesting fish, rather than in supporting other vessels. Japan's support vessels comprise about 20 percent of the fleets' tonnage. In comparison, Soviet support vessels make up nearly 50 percent of the fleets' tonnage.

OWNERSHIP, EMPLOYMENT AND WAGES

Japan's approximately 230,000 marine fishing firms are privately owned. Small family-run coastal fisheries account for more than 90 percent of the total number. But, in 1969, the latest year for which information was available, four enterprises controlled the majority of distant water fisheries.

A network of more than 3,000 local, prefectural and national level fishery cooperative associations provide support to the Japanese fishing industry. Additionally, specialized associations exist for large companies and specific types of fisheries, such as salmon, tuna, trawler, and set-net

fisheries. Depending on the level and type of cooperative, the associations provide the following kinds of services to fisheries:

--Procure and supply fuel oil, fishing gear and other provisions domestically, abroad and at sea.

--Provide for transshipment, storage, processing and marketing of members' catch.

--Insure fisheries against accidents and other losses.

--Provide education and guidance in fishing business management, and other relevant matters.

--Extend credit, arrange financing, and channel government loan funds to fishing companies.

--Lobby for the fisheries in domestic matters, and participate in international negotiations on their part.

The cooperative associations operate through funds received from membership dues and commissions on services provided. In addition to being indispensible organizations for fishermen, they play an important role in implementing Government development policies.

Employment in the fishing industry has steadily declined from 700,000 in 1955 to less than 500,000 in 1974. In spite of this decrease, the remaining fishery workers are relatively young. Men between 15 and 39 years old make up 31 percent of the labor force, men 60 years old and over, 14 percent, and women 17 percent of the labor force. Japan Fisheries Agency officials attribute the decline in fishery workers to increased productivity levels, migration of younger workers to industrial sector jobs, and to the general economic difficulties of the fishing industry.

Japan's coastal fisheries, generally small and family-operated enterprises, are not represented by labor unions. Employees of offshore and distant water fisheries, however, belong to branches of the powerful National Seamen's Union, or to large company unions having strong associations with the national union. Employees involved in fish processing belong to a national union for food processors. Industry officials told us that fishing companies must negotiate several times annually with unions, separately determining wages and employees' bonuses. Unions have also gained other advances for employees. In the cases of distant water

fisheries, the companies have to return the crews to Japan every 10 months, leaving the vessels at foreign ports for inspection and repairs, while flying entire crews to and from Japan. Formerly, crews remained at sea for 14 months or longer.

According to statistics developed by the Japan Fisheries Agency, annual family incomes of coastal fishery workers have lost ground to their agricultural and city worker counterparts, as shown below.

	Family income		
	1972	1974	Percent increase
Fisheries worker	$7,333	$ 9,500	29.5
Agricultural worker	7,000	11,333	61.9
City worker	5,833	8,333	42.9

MAJOR FISHING GROUNDS

Although Japan's fishing presence is worldwide, 19.6 billion pounds, or over 80 percent, of its 1973 catch was harvested in the Northwest Pacific area. Another 2,116.4 million pounds came from the Northeast Pacific. Japan's harvest from all other areas totaled about 1,763 million pounds.

Production of Japan's coastal fisheries remained about the same from 1964 to 1974, whereas production of its other fisheries have increased greatly as shown below.

Fishery type	Production	
	1964	1974
	(billions of pounds)	
Coastal	4.2	4.1
Inland and marine cultures	1.1	2.3
Offshore	5.5	9.2
Distant water	3.7	8.1

In recent years, the Japanese Government has placed emphasis on abating marine pollution, developing its coastal fishing grounds and increasing aquaculture and mariculture production. They have also made great strides in the artificial hatching and release in coastal waters of such species as abalone, chum salmon, eel, and sea bream.

SIZE AND COMPOSITION OF THE HARVEST

The composition of Japan's 1974 total fisheries catch by major species follows.

Species	Billions of pounds harvested	Percent of total catch
Cod, pollock	6.5	27.3
Mackerel	2.9	12.2
Sardines, herring	1.0	4.2
Skipjack, frigate mackerel	.8	3.4
Flounder, halibut	.8	3.4
Tunas	.8	3.4
Sand lance	.7	2.9
Anchovy	.6	2.5
Mollusks (squid, octopus, shellfish)	1.9	8.0
Crustaceans (crab, lobster, shrimp)	.4	1.6
Other species (including cultures)	7.4	31.1
Total	23.8	100.0

Marine culture species, including yellow tails, oysters, seaweeds and others, accounted for 1,940 million pounds or 8 percent of the total 1974 catch and represented 13 percent of its value.

Japan's 1974 catch was valued at about $5.8 billion. The following table shows the major species in rank of value.

Species	Value (in millions)	Percent of total value
Mollusks	$ 771	13.3
Tunas	673	11.6
Cod, pollock	372	6.4
Crustaceans	301	5.2
Salmon, trout	261	4.5
Skipjack, frigate mackerel	247	4.3
Mackerel	213	3.7
Flounder, halibut	191	3.3
Other species (including cultures)	2,771	47.7
Total	$5,800	100.0

As shown above, although cod, pollock and mackerel made up about 40 percent of Japan's total 1974 catch, they represented only 10 percent of its value. On the other hand, mollusks and tunas, making up only 11 percent of the catch, accounted for 25 percent of its value.

Trends in catch quantity from 1970 to 1974 showed substantial increases in the harvest of Alaskan pollock (1122.1 million pounds), sardines and herring (740.7 million pounds), skipjack and frigate mackerel (313.1 million pounds), flounder and halibut (134.5 million pounds), tunas (127.9 million pounds), and marine cultures including yellowtail, oyster and seaweed (729.7 million pounds). Significant decreases were shown in the harvests of anchovy (171.9 million pounds) and mollusks (176.4 million pounds), primarily common squid and octopus.

According to Japan Fisheries Agency officials, preliminary statistics indicate that Japan's total 1975 catch decreased about 7 percent from the 1974 level, due mainly to declines in cultures and distant water fishing.

PROCESSING FACILITIES

Japan operated 14,400 fish processing plants in 1971, a reduction of 18 percent since 1961.[1] Older plants were closed because they did not meet pollution control requirements and the remaining plants were enlarged and improved. The most notable processing improvement in recent years has been a greatly expanded capacity for storing fish, both on land and at sea.

Fish processing plant workers are unionized. The workers' salaries are based on the negotiations between their unions and the processing plants.

DOMESTIC USE OF FISH PRODUCTS

In 1974 Japan processed 14,812.7 million pounds of fish or 62 percent of the total catch. Eighty-three percent of the processed fish was used for food, 12,279.6 million pounds, and the remaining 17 percent was used for nonfood products, 2,533.1 million pounds.

The principal fishfood consisted of frozen, 53 percent, fish sausage and cake, 21 percent, and canned, 7 percent. The nonfood fish products were processed into fertilizer, 84 percent, and fish oils and fats, 16 percent.

1/ These were plants located on land. The fishing fleet also processes fish at sea.

Even though Japan's fisheries have produced record catches in recent years, they cannot satisfy the country's demand for fish, particularly of the luxury-type species. Japanese consumption of meat and poultry has increased over the past several years; however, their dependence on fish as a source of nourishment is still very high.

In the course of Japan's distribution and marketing processes, the fish product passes through numerous intermediaries before reaching the consumer. With the exception of the large fishing companies' catches, fish landed at coastal fishing ports are first auctioned to wholesalers at producing-center markets. The wholesalers separate the catches for local consumption, shipment to large cities, and for processing and freezing. Fish transported by cold storage trucks and trains to large cities are again auctioned to consumer-market wholesalers, who distribute the fish products to Japan's more than 50,000 retailers. The price differential between the wholesaler and retailer varies from 25 to 180 percent.

Recently, most fish arriving at large city wholesale markets is in frozen form. This trend has aided in the preservation of quality and the stabilization of supply. Also, the marketing of prepackaged frozen fishery foods is increasing.

The trend in Japanese consumer prices for fishery products shows a definite increase in comparison with the general consumer price index. In 1965 the general consumer price index of 100 increased to 144.6 in 1972. During that same period the price index for fresh fish and shellfish increased to 218.8. This trend is expected to continue, but at a slower rate. Future increases in consumer prices will probably be necessary to restore the financial health of the country's fishing industries.

IMPORTS AND EXPORTS

Since 1971 Japan has been a net importer of fish products, with the value of fish imports increasing 244 percent between 1969 and 1974. According to an importer's association official, the Japanese Government is not concerned about this trade imbalance, because fisheries' products represent only 2.5 percent of total imports.

Fresh and frozen shrimp accounted for 36 percent, $1.1 billion, of Japan's fish imports in 1974. Other high-value import items included fresh and frozen skipjack tunas and other fish, 35 percent, salted dried and smoked fish, 12 percent, prepared fish, 6 percent, and live fish, 6 percent. The main sources of imports were as follows.

Country	Percent of total import value	Major species imported
South Korea	19	Fresh, frozen and prepared fish
Taiwan	9	Live fish, fresh, and frozen fish
China	9	Shrimp and salted, dried and smoked fish
Indonesia	8	Shrimp
Spain	6	Fresh and frozen fish
India	5	Shrimp

In 1973, Japan, the world's leading exporter of fish products, accounted for 12.3 percent of world fish exports by value. The overall trend in 1974, though, was one of stagnation.

From 1969 to 1974 the value of fish products exported increased 62 percent, although imported fish products increased 244 percent. Following are Japan's major fish product exports:

Major exported product	Percent of total 1974 export value
Canned mackerel	17.6
Canned tunas	14.4
Canned salmon	6.4
Frozen tunas, marlins, and skipjack	12.0
Other frozen fish	21.1

As shown below, the United States is, by far, the largest import market for Japanese fish products.

Nation	Percent of total 1974 export value	Major export products
United States	30.8	Canned tunas and mackerel, frozen tunas and other fish
Netherlands	7.1	Canned salmon, whale oil and fat
United Kingdom	5.4	Canned salmon and tunas
Australia	4.2	Canned salmon, frozen fish
Philippines	4.1	Canned mackerel
West Germany	4.1	Canned tunas, pearls

Japan's 1975 fishery exports were seriously hurt by U.S. canners' reduction of tuna imports. The U.S. canners' build-up of large inventories of raw and canned tuna practically closed the U.S. market for Japanese tuna exports in early 1975. A national tuna fisheries association official said that about two-thirds of Japan's tuna industries are currently incurring financial losses.

ECONOMIC ROLE OF THE INDUSTRY

The fishing industry makes an important contribution to the Japanese economy, but its importance has diminished in recent years because other industrial sectors have grown more rapidly. In 1973 the gross value of fisheries output was about 1 percent of Japan's gross domestic product.

In 1973 the productivity in the fishing industry was diminishing, compared with the productivity in other industrial sectors. The United Nations' Organization for Economic Cooperation and Development reported that the slowing of the productivity growth rate in the fishing industry is a major obstacle to the industry's future growth. This organization also indicated that economic difficulties in the fishing industry were compounded by rising costs, especially for fuel.

The fishing industry makes a major contribution to the economy by providing a food supply. Fish products accounted for about one-half of the Japanese animal protein consumption in 1973. In contrast, fish products provide only about 5 percent of the animal protein consumed in many Western countries. Although fish products continue to be a staple in the Japanese diet, they are relying less on fish and more on meat products for their animal protein needs.

The net effect of fish products on Japan's foreign trade has not been favorable in recent years. In 1971, Japan, for the first time, became a net importer of fish products when imports exceeded exports by about $50 million.

GOVERNMENT ROLE IN FISHERIES

The Japanese Government, through its Fisheries Agency, takes an active role in supporting its fishing industry. The recently developing financial problems of Japan's fisheries have caused the Government to institute a number of loan assistance programs, mainly to help its small- and medium-sized fisheries. Traditionally, the Japanese Government has supported the industry through the development of fishing ports, other coastal facilities, and fishery research, education, and propagation programs.

Policy aims

According to the Food and Agriculture Organization of the United Nations, Japan's fisheries policy is aimed at

--insuring an adequate fish supply to meet national animal protein requirements,

--providing fishermen with incomes comparable to other sectors of the economy,

--protecting marine resources against overfishing, and

--cooperating with international efforts to better conserve and utilize fish catches.

Fisheries Agency

The Agency, under the Ministry of Agriculture and Forestry, has direct control over its fisheries. With a fiscal year 1976 operating budget of $472 million the Agency receives slightly more than 6 percent of the Ministry of Agriculture and Forestry's total general budget of $7.4 billion. However, separate funds for insurance programs, loans, and investments provide the Agency with an additional $637 million for fiscal year 1976.

The Agency's approved fiscal year 1976 operating budget funds for seven major program areas follow.

1. Port facilities--$284 million--subsidizes local and prefectural government projects for the construction and rehabilitation of fishing ports and other coastal facilities.

2. Coastal fisheries promotion--$41.6 million--provides funding for the Agency's coastal fishery industry modernization program, mariculture development program, salmon hatchery program, and fisheries extension services. Also included is preliminary funding for the recently approved coastal fishing grounds development program.

3. International affairs--$26.2 million--includes funds transferred to the Overseas Fishery Cooperation Foundation and to the Japan Marine Resource Research Center.

4. Vessel loss and disaster insurance--$25.2 million--provides subsidies to insurance cooperatives for compensation of vessel losses and disaster damages.

5. Price stabilization--$25.1 million--provides assistance in the form of subsidized loans and other support to national level cooperatives in their efforts to stabilize domestic fish prices. The cooperatives purchase and store fish when market prices fall below floor levels and resell them when prices rise.

6. Fisheries management stabilization--$5.4 million--funds the cost of subsidized loans made to fishing companies for the liquidation of accumulated debts, and assistance with increased fuel costs. It also provides for low-interest, long-term loans to tuna industry cooperatives for the repurchase of existing licenses in connection with the Government and industry program to reduce the size of the tuna fleet.

7. Other--$24.7 million--includes funding of agency programs for fisheries modernization, abatement of water pollution, fisheries enforcement, and research vessel construction.

The loan and investment budget, $539 million, provides capital funding for the Agriculture, Forestry and Fisheries Finance Corporation, with the National credit institution funneling Government funds to cooperative associations and fisheries. It also provides capital for the National Fisheries Modernization Fund and Japan Development Bank.

Research programs

Nine national fisheries research laboratories and a network of 80 prefectural experimental and branch research stations conduct extensive research programs on fishing, marine biology and other oceanography areas.

The Japan Marine Resource Research Center, established in 1971, has conducted research for the purpose of developing and exploiting underutilized and dormant fishery resources. Aided by the Center's research efforts, one major fishing company recently began commercial production of Antarctic krill for use in fish sausage and frozen fish products.

In 1975 a new research organization, the Marine Ecology Research Institute was established to study the biological effects of heat produced by electric generating plants on the coastal marine environment.

Additionally, Japan has 17 universities which have fisheries curriculum and over 50 high schools specializing in fisheries education.

Management programs

Japan's fishing industry is governed by a complex system of national and prefectural (state) fishing rights and licenses. Coastal fisheries are governed by prefectures, in accordance with national fishing laws. The prefectures regulate fishing seasons, zones, size of specie catch, method of fishing, and quotas on catch for certain species. The national Government regulates offshore and distant water fisheries, although offshore fishing licenses are granted by the prefectures.

Japan controls and coordinates its fisheries as a unit. Fishing effort is controlled through increasing or decreasing the number of licenses made available. Every 5 years the Central Fisheries Coordination Committee, an advisory body of the Ministry of Agriculture and Forestry, determines the number of vessels that are to be licensed by size, fishing area, and periods of operation. This determination is based on factors such as resource availability, number of vessels already engaged in each fishery, and financial and managerial considerations. When reductions are decided upon, the Government works with the network of fishermen's cooperative associations to accomplish the desired results.

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Propagation programs

Japan has a long history of propagation efforts (hatchery and stocking activities) to maintain and increase fishery resources. In recent years these efforts have been intensified. Government-supported salmon hatcheries spawn and release over 700 million salmon fries annually. Japan also artificially hatches large numbers of sea bream fries, trout, french oysters and abalone for release in coastal and inland waters.

Sanitation regulations

The Japanese Government is substantially involved in fish inspection programs to insure that fish products are safe and of high quality. The Japanese Food Sanitation Law governs food in general and there are other national laws applying to shellfish sanitation. Laws are enforced through stringent government inspection programs.

Japan is a member nation of the National Shellfish Sanitation Program--a voluntary sanitation program concerned with clams, oysters, and mussels and administered by the United States Food and Drug Administration, Department of Health, Education, and Welfare. The Ministry of Health and Welfare carries out the program in Japan. In 1974 Food and Drug Administration officials reviewed and evaluated Japan's sanitary controls over its oyster fishery and found the controls to be very stringent. According to Agency officials, the fishing industry is, in large part, self-regulating. There is a strong incentive for the industry to maintain a high quality breed of fish. At market, the fish are individually auctioned, price being determined by quality because Japanese consumers are discriminating in their selection of fish since they eat much of it raw.

MEXICO

PRESENT SITUATION AND TRENDS IN THE MEXICAN FISHING INDUSTRY

Mexico, although not a major fishing nation, is anticipating continued growth of its expanding fishing industry. Between 1969 and 1973 Mexico's fish harvest increased rapidly along with domestic and international demands for Mexican fish products. During the same period, the price of fish products increased by 39 percent and remained prohibitively high for many Mexican citizens.

Since 1970 the government has played an important role in developing the fishing industry. A subsecretary for fisheries was appointed in the Ministry of Industry and Commerce and a goal was established to increase Mexico's annual fishery harvest from about 560 million pounds in 1970 to over 1 billion pounds in 1976. Government actions to improve fisheries included:

--Approximately $240 million was invested in the fishing industry. The funds were used primarily to modernize the fleet and to improve seaports and product marketing.

--Thirty technical fishery schools were established.

--The Federal Law for the Development of Fisheries was enacted to (1) strengthen fishery cooperatives which are under tight government control, (2) investigate fishery resources and fish cultivation, and (3) regulate fishery marketing practices.

--A quasi-government corporation was formed to improve management of the fishing industry and fishery resources and to provide consumers with high quality, reasonably priced seafoods.

Future growth and stability of Mexico's fishing industry appears likely. Between 1969 and 1973 exports of fish products have increased and imports have declined. Important export markets have been established in the United States and Japan.

Mexico expects that domestic consumption of fishery products will continue to grow as unexploited coastal waters provide new harvesting opportunities. The Organization for Economic Cooperation and Development, a major international organization promoting stable economic growth, estimates that these coastal waters contain thriving stocks of anchovy, sardine, and mackerel. Increased harvests are also likely because Mexico has claimed exclusive fishing rights in a 200-mile economic zone off its coasts. Through

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this action Mexico asserted fishing rights over rich shrimp beds in the Gulf of Mexico and over tuna fishing areas in the Pacific Ocean. To take advantage of these opportunities, harvesting capacity of the Mexican fishing fleet is being increased.

EFFECT OF EXTENDED JURISDICTION

Having declared a 200-mile exclusive economic zone, Mexico is ready to negotiate fishing arrangements with nations which have established or may establish similar zones. Because Mexico primarily fishes in its own coastal waters, economic zones established by most other nations will not affect Mexico's harvest.

Mexico will permit foreign fishing in its waters only to the extent that Mexican vessels harvest their full capacity and remaining stocks are not overfished. Fishing licenses will be granted to vessels from nations which have historically fished in Mexican waters, including the United States, Cuba, and Japan. However, as Mexico's harvesting capability increases, fewer licenses will be issued. Nations not expected to be granted fishing licenses include France, Poland, the Soviet Union, and Spain.

Fishing rights in Mexico's extended economic zone will be enforced by the Mexican navy which is expected to have 100 vessels ready for this purpose by the end of 1976. Because Mexico's most important fishing areas are either in coastal waters or in clearly defined fishing areas, it believes effective enforcement operations will not be difficult to carry out.

Mexico's extended economic zone overlaps the zone established by the United States. The two nations differ on policy regarding exclusive fishing rights over highly migratory species, such as tuna. Whereas the United States regards these species as common international property, Mexico has declared fishing rights over the species located in its waters.

STRUCTURE OF THE FISHING FLEET

Mexico's fishing vessels increased from about 15,000 in 1969 to approximately 22,000 in 1973, an increase of nearly 47 percent. Only about 2,300 of these vessels

operate on the high seas. The high seas fleet, by fishery, follows:

Fishery	Number
Shrimp	1,955
Finfish	261
Sardine	68
Tuna	21
Cod	2
Total	2,307

Few of the vessels are of the large type used by major fishing nations such as Japan and the Soviet Union. Japanese and Soviet vessels of over 100 gross registered tons can remain at sea for extended periods to conduct massive harvesting operations. Shrimp boats, weighing about 30 gross registered tons, constitute about 85 percent of Mexico's high seas fleet. These boats can remain at sea for only a few weeks and have a limited storage capacity.

The Mexican fleet has become more modern with the rapid increase in the number of fishing vessels. However, the fleet still lacks needed equipment, such as refrigerated hulls for preserving fish. One of Mexico's principal goals is to modernize the fleet.

OWNERSHIP, EMPLOYMENT, AND WAGES

The Mexican fleet is owned by three sectors: cooperatives which are assisted and heavily controlled by the government, individual private enterprises, and the government.

The government reserves certain valuable fisheries for the approximately 300 cooperatives. Reserved species include abalone, clams, lobsters, oysters, rock bass, and shrimp. Individual private enterprises harvest fisheries not reserved for cooperatives, while the government harvests only selected fisheries, such as cod. The following table illustrates the approximate percent of the total 1973 harvest and dollar value which is attributed to each sector of the Mexican fishing fleet.

According to the Food and Agriculture Organization of the United Nations, the fishing industry employed 65,514 people during 1974, a 47-percent increase over the 1969 employment level. Mexicans employed in fisheries other

Sector	Harvest (percent)	Dollar value (percent)
Cooperatives	34	66
Private business	66	34
Government	(a)	(a)
Total	100	100

[a]Less than 1 percent.

than shrimp and tuna earn little more than subsistence incomes. Earnings of shrimp and tuna fishermen are based on harvest size and the earnings are high in comparison to those of the average Mexican worker. For example, a crewman on a tuna boat landing a reasonably good harvest of 600 tons after a 60- to 90-day fishing trip, earns about $4,000. A tuna boat captain earns about $18,500 annually.

MAJOR FISHING GROUNDS

Nearly all fishing operations are conducted in Mexico's coastal waters. The Pacific Ocean provides 70 percent of Mexico's harvest and the Gulf of Mexico provides the remaining 30 percent. With increased government emphasis on developing the fishing industry, there have been efforts to identify and develop new fishing grounds. The best prospects are in the Pacific Ocean off Mexico's northwest coast and in the coastal waters of Baja, California. The Food and Agricultural Organization estimates that these areas contain thousands of tons of anchovies, sardines, mackerel, squid, sauries, oceanic red crabs, and rock lobsters. In addition, numerous lagoons and estuaries, on both of Mexico's coasts, can be developed for fish cultivation.

SIZE AND COMPOSITION OF THE HARVEST

Mexico produced less than 1 percent of the world's fish harvest in 1973; however, in the past several years the harvest has grown considerably in quantity and value. Mexico's 1973 harvest consisted of about 979 million pounds of fish and shellfish valued at approximately $142 million.

Between 1969 and 1973, herring, oysters, redfish, shrimp, and tuna were the principal species harvested in terms of value and quantity. The following table shows the quantity harvested in 1973.

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Species	Quantity (million pounds)	Percent of total harvest
Shrimp (includes prawn)	160.9	16
Herring (includes sardine, pilchard, and anchovy)	149.9	15
Redfish (includes snook, grouper, snapper, and mojarras)	94.8	10
Oyster	68.3	7
Tuna (includes wahoo, sierra king, mackeral, and skipjack)	66.1	7
Subtotal	540.0	55
All other	438.8	45
Total	978.8	100

The harvest of herring increased most notably (94 percent) between 1969 and 1973. While tuna and redfish harvests increased by over 50 percent and shrimp by over 20 percent, the oyster harvest declined by 45 percent. The total harvest increased by nearly 40 percent and the harvest of the principal species increased by 25 percent.

The following table shows the value of the principal species harvested in 1973.

Species	Value (millions)	Percent of total value
Shrimp (includes prawn)	$ 71.2	50
Redfish (includes snook, grouper, snapper, and morjarras)	16.7	12
Tuna (includes wahoo, sierra king, mackerel, and skipjack)	10.9	8
Herring (includes sardine, pilchard, and anchovy)	10.7	8
Oysters	3.2	2
Subtotal	112.7	80
All other	29.0	20
Total	$141.7	100

The value of each major species, except oysters, increased substantially between 1969 and 1973. Herring increased by over 350 percent, tuna by over 100 percent, redfish by over 90 percent, and shrimp by over 70 percent. The value of oysters declined by 39 percent. Value of the total harvest increased by 94 percent and value of the principal species increased by 79 percent.

PROCESSING FACILITIES

In 1971 a quasi-government corporation was formed to improve the fishing industry by coordinating the operations of processing plants and fishing companies. Recently there have also been several improvements in processing facilities. The success of these efforts is reflected in a strong trend toward domestic production of fish meal.

In 1973 the Port of Alvarado--a major processing port--was being modernized resulting in an increase in fishing vessels--13 in 1970 to 57 in 1973--supplying this port's processing facilities. Other examples of improvements in processing since 1970 follow:

--The private sector of the fishing industry constructed a modern canning plant costing over $4 million.

--New processing techniques have made it possible to process fish meal on vessels at sea.

--Thirty technical fishery schools with processing laboratories were established to provide a trained labor force for the fishing industry.

DOMESTIC USE OF FISH PRODUCTS

In 1973 two-thirds of Mexico's fish products were used for food and the remainder was primarily used for fish meal. Per capita fish consumption increased by 29 percent between 1969 and 1973; however, fish continues to be a small part of the Mexican diet. In 1973 per capita consumption was 9.9 pounds. As the following table shows, fresh fish was the primary type of seafood consumed.

Fish products	Percent of total
Fresh	56
Frozen	20
Canned	18
Cured	6
	100

The types of seafood consumed remained fairly constant between 1969 and 1973, one exception being that fresh fish declined by 7 percent and canned fish increased by 7 percent. During the same period the portion of the domestic supply used for industrial purposes fluctuated, ranging from 34 percent to 40 percent of the total harvest.

A NMFS official told us that there is a high Mexican demand for lobster, red snapper, and shrimp. The government has attempted to make these species available to Mexican citizens by limiting the prices of the fish products, which are negotiated at the point of sale. The price in 1973 was prohibitively high for many Mexican citizens.

IMPORTS AND EXPORTS

Between 1969 and 1973 Mexican fishery imports have greatly decreased and exports have greatly increased. The price per ton of both has increased, but the price of imports increased by a much greater margin.

Imports

In 1973 Mexico imported about 38 million pounds of fish products--76 percent less than was imported in 1969. During the same period the value of imports declined by 32 percent to a 1973 level of $8.6 million. The reduced imports were almost entirely due to greater domestic production of fish meal, the only fish product Mexico imported in large quantities between 1969 and 1973. Although fish meal imports declined by 80 percent during that period, they remained Mexico's major fishery import, representing 79 percent of total fishery imports in 1973. Nearly all of the fish meal was imported from Peru.

The quantity and value of imports from 1969 to 1973 is shown below.

Year	Quantity (million pounds)	Value (millions)
1969	161.0	$12.6
1970	185.0	21.3
1971	237.0	22.4
1972	194.0	18.3
1973	38.0	8.6

As illustrated, in 1971 imports were highest in both quantity and value. The quantity imported in 1973 was only 16 percent and the value imported was only 38 percent of the 1971 level. However, the price per ton of fishery imports

increased dramatically, from about $172 per ton in 1962 to approximately $503 per ton in 1973--a 192-percent increase.

Exports

While Mexican imports have been decreasing, exports have been increasing. In 1973 fishery exports totaled 95 million pounds valued at $97.8 million. In 1974 fishery exports accounted for about 3 percent of total Mexican exports, and shrimp, representing 85 percent of the value of fishery exports, was Mexico's fifth largest export commodity.

The quantity and value of Mexico's fishery exports from 1969 to 1973 is shown in the following table.

Year	Quantity (million pounds)	Value (millions)
1969	74	$60.3
1970	83	71.5
1971	93	79.0
1972	102	88.6
1973	95	97.8

The price per ton of fishery exports remained fairly stable from 1969 to 1972, increasing by 6 percent. However, in 1973 the price of exports increased 26 percent above the 1969 level. The United States imported about 80 percent of Mexico's 1973 shrimp exports; Japan was the only other notable foreign market.

ECONOMIC ROLE OF THE FISHING INDUSTRY

In 1974 the Mexican fishing industry accounted for 0.7 percent of its gross national product. Between 1969 and 1973 the industry became more important to the nation's food supply, shipbuilding industry, and foreign trade.

Per capita fish consumption increased from 7.7 pounds to 9.9 pounds, a 29-percent increase. With expected increases in the harvest, the Mexican Government anticipates that fisheries will become increasingly important as a food source.

Because of government efforts to modernize the fishing fleet, by 1975 150 shrimp trawlers had been constructed and 238 vessels were under construction. As a result, the shipbuilding industry has been strengthened and shipyards are building vessels for foreign nations. This has provided employment for Mexicans and contributed to Mexico's foreign trade.

Between 1969 and 1973 foreign exchange for fishery products has resulted in surpluses for Mexico, as illustrated below.

Year	Net fishery product trade surplus (millions)	Rate of growth (1969 = 100)
1969	$47.8	100
1970	50.1	105
1971	56.7	119
1972	70.2	147
1973	89.2	187

GOVERNMENT ROLE IN FISHERIES

The government's fishery policies since the early 1970s have been designed to substantially increase Mexico's production. In 1970 production was about 560 million pounds and a goal of 1.1 billion pounds by 1976 was established.

In 1970 a subsecretary for fisheries was appointed to serve in the Ministry of Industry and Commerce to develop national policies for fisheries. This action emphasized the importance of the fishing industry by promoting the fisheries' decisions to the cabinet level. Under the subsecretary, five directorates were created to manage fishery activities; previously there had been one directorate responsible for all fishery activities.

In 1971 a quasi-government corporation--51-percent government-owned and wholly government-operated--was created to improve fishery management. The corporation gained control over 20 fishery and related enterprises, including shrimp packing plants, sardine and tuna operations, fish meal plants, and a shipyard. In addition, the corporation gained control over processing most of the shrimp produced on Mexico's Pacific coast.

The next major step in strengthening the fishing industry occurred in 1972 when a fishing vessel construction program was established. The program called for the completion of 400 shrimp boats, 80 finfish vessels, and 20 tuna boats by 1976. The shrimp industry was already overcapitalized, having more vessels than needed to harvest a limited supply of shrimp; however, the premise of the new construction program aimed to replace every 14 obsolete boats with 10 modern shrimp boats.

Another indication of Mexico's growing interest in fisheries was the enactment in 1972 of the Federal Law for the Development of Fisheries. This law was the first major revision of Mexico's fishery laws in 22 years. Among other things the law was designed to

--strengthen fishery cooperatives,

--authorize the use of factory ships for processing fish products,

--increase a trust fund for fishery development by 50 percent,

--increase penalties for violating Mexico's fishing laws,

--investigate fishery resources and fish cultivation, and

--regulate fishery marketing practices.

The law also established that only government-licensed vessels may harvest fish and shellfish and licenses may be revoked for failure to comply with fishing regulations. Fishery cooperatives which have exclusive fishing rights over the more valuable species may pay as much as 10 percent of their total investment in fisheries for a license. Licenses issued to other fishing enterprises may cost as much as $400 and foreign vessels may pay as much as $8,000 for their licenses.

Under the fisheries law, the government can prevent overfishing by limiting the number of fishing vessels; restricting the type of fishing gear and equipment used; establishing seasons during which species may not be fished; restricting fishing for certain species; establishing a minimum size for species fished; and imposing quotas on the quantities of fish and shellfish harvested.

In February 1976 the Mexican Government declared an exclusive economic zone extending 200 miles off the Mexican coasts. This action allowed for the development of a variety of fisheries and emphasized the government's interest in the fishing industry.

Between 1970 and 1975 the Mexican Government has been involved in several fishery support programs. For example, investments were made to improve marketing of fish products ($25 million); to improve seaports ($12 million); and to train citizens for employment in the industry ($5 million).

In addition, price supports were offered to the shrimp industry and subsidies were offered to fishermen cooperatives to purchase necessary fuel and oil.

The government is also involved in technical and scientific research concerning economically important species. This research is supported by 11 fishery investigation stations located on the Pacific and Gulf coasts. To develop new fisheries, the Mexican Government has entered into joint research programs with foreign fishing interests. In March 1974 government and two private Mexican companies agreed with a Peruvian consortium to conduct exploratory fishing operations in Mexican waters and in November 1974, West German vessels were permitted to use a Mexican port to conduct exploratory fishing operations.

In recent years, Mexico has established the basic framework for strengthening its fishing industry. Advances in fishing technology and in marketing and processing techniques will be required to meet the primary goals of the fishing industry. A major goal is to increase the supply of food fish at prices acceptable to consumers. This will require expanded resource investigations, increased investments in fishing vessels and in fish product distribution networks, and fish product promotion campaigns. Other objectives are:

--To diversify Mexican fisheries.

--To introduce and enforce a management scheme for improving economic stability of the shrimp industry.

--To increase domestic production of fish meal.

--To train personnel for all sectors of the fishing industry.

The Mexican Government has played an active role in these areas during the past several years. Because of the strong support of and control over the fishing industry, the government will probably continue to provide the impetus for the industry's growth.

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SOVIET UNION

PRESENT SITUATION AND TRENDS IN THE SOVIET FISHING INDUSTRY

During the past two decades the Soviet Union has become one of the world's most modern fishing nations. In 1973 the Soviet Union owned the world's largest fishing fleet and harvest quantity was second only to that of Japan.

The Soviet harvest represented 14 percent of the world's in 1973 and its harvest has been increasing at a much faster rate. Between 1950 and 1973 the Soviet harvest increased at an average annual rate of 17.9 percent while the world harvest increased at an average annual rate of 6.7 percent.

Per capita fish consumption in the Soviet Union in 1973 was about three times higher than in the U.S. To meet the Nation's nutritional requirements, the Soviet Government has set a per capita fish consumption goal which is to be met by 1978.

NMFS observed that while the Soviet government stresses conservation of the world's fish resources in policy speeches, trends indicate that the Soviet Union does not plan to cut back on its total catch as environmental considerations may demand. Continued emphasis on expanding the fishing industry is shown in the Soviet Union's 5-year plan for 1976 through 1980. While output of all sectors of the food industry is to be increased by 23 to 25 percent, the output of commercial fish produce is to be increased by 30 to 32 percent, indicating a much greater reliance on fish to meet protein needs. Other fishery goals set forth in the plan are:

--Expansion of fish meal production for livestock.

--Better methods of fishing and processing seafoods with emphasis on increased automation.

--Development of new fishing grounds and new fish species to be harvested. This goal includes increasing stocks of "valuable" fish species in inland waters and increasing the production of fish farms by 70 percent.

--A 16- to 18-percent increase in labor productivity. This increase is comparable to that expected in the meat and dairy industry (17 to 19 percent).

--An increase in the preparation of high-quality marine fish produce and better packaging of fishery products.

--Development of a wide scale network of shore based processing enterprises and trade and retail outlets. This should lessen the effects of a disproportionate investment in the fishing fleet over previous years and possibly correct the problem of poor distribution of processed fishery products.

This 5-year plan indicates that the Soviet Union wants to increase the efficiency of the fleet and better utilize the harvest. An awareness of increasing international quotas and expanding territorial limits is indicated by the Soviet goal to locate and develop new fishing grounds. The ability to do so could have a considerable influence on the growth of the Soviet fishing industry over the next 5 years.

EFFECTS OF EXTENDED JURISDICTION

The Soviet Union has not formally commented on the unilateral action of the United States extending its economic zone to 200 miles. Informally, the Soviet Union has indicated a willingness to abide by U.S. quotas for fish harvested. The most recent Soviet position at the Law of the Sea Conference was in support of a worldwide 200-mile economic zone in which coastal nations have sovereign rights to all resources within their respective zones. However, an additional qualification by the Soviet Union is that all nations should be allowed to harvest surplus fish and shellfish in these waters and that developing nations should receive compensation for allowing foreign nations to harvest in their waters.

Because the Soviet Union harvests about one-half of its total fishery harvest in coastal waters of foreign nations, the Soviet government is concerned about future prohibitions to fish in these waters. On the basis of the Soviet position at the Law of the Sea Conference, the Library of Congress' Congressional Research Service concluded that there is a unified Soviet policy which covers the whole spectrum of Soviet ocean interests. The Congressional Research Service believes that this unified policy, which governs the Soviet position on the rights of navy, maritime, and fishing vessels, should help the Soviet Union in ocean-related negotiations. One of the basic positions of the Soviet Union is that all vessels should be afforded unhindered navigation through international straits.

STRUCTURE OF THE FISHING FLEET

In terms of gross registered tons, the Soviet fishing fleet is the world's largest. In 1975 there were over 80,000 vessels in the fleet; however, only about 18,000 were motor powered, with over 4,000 equipped for high seas distant water operations. Most vessels were small coastal craft or inland-water boats.

The following table shows detailed tonnage data for the Soviet high seas fleet in 1974.

Type of vessel	Gross registered tons	Number of vessels	Total gross registered tons
Fishing vessels	100 to 499	2,025	434,294
	500 to 999	781	494,518
	Over 1,000	710	1,876,130
		3,516	2,804,942
Fishing support vessels	(a)	527	2,805,072
Total		4,043	5,610,014

[a]Information not available.

The trend in Soviet vessel construction during the past 20 years shows a steady increase in the number of vessels capable of operating on the high seas. According to NMFS, the number of trawlers, large seiners, and whaling vessels has almost doubled since 1955 and the number of support vessels has more than quadrupled.

The trend toward larger vessels and a greater number of support vessels is attributable to the Soviet Union's emphasis on fishing in distant waters. Successful distant water fishing requires that vessels remain at sea for a long time. Large vessels, such as stern factory trawlers, can remain at sea for up to a year, provided there is periodic crew rotation and supplies and fuel are made available to the vessels.

The stern trawlers are escorted to sea by nonfishing support vessels which provide general logistics to the fishing vessels such as fuel, water, salt, gear, and medical and recreational facilities. Once the fish are harvested, the stern trawlers can immediately process and transfer the catch to support vessels which transport the catch to Soviet or another nation's seaports.

Type of food	Percent of total value
Meat and dairy products	84.8
Fish products	8.3
Other	6.9
Total	100.0

NMFS found that Soviet fishing exports have become progressively more important to the economy as foreign funds obtained through a foreign trade surplus have become more difficult to obtain. In 1974 Soviet fish exports exceeded imports by $23 million.

GOVERNMENT ROLE IN THE FISHING INDUSTRY

The Soviet government through its Fishery Ministry controls the fishing industry and provides both policy guidance and funding to the industry. Support programs for the industry are significant; $5.2 billion was invested in the industry from 1971 through 1975. The fishing fleet, rather than processing facilities, receives most of these investments. There is a trend, however, toward providing a greater portion of the investments to the processing sector.

The Soviet government has the world's largest fishing training fleet. Costs of maintaining the fleet are partly offset by earnings from the fleet's harvest.

The Soviet Union operates an extensive oceanographic research program. Research areas include undersea research and development, deep sea diving and underwater habitats, and marine biology and aquaculture. In 1974 about 200 vessels and 7,000 to 8,000 scientists were engaged in oceanographic research.

Management programs of the government are concerned with conserving fish stocks. This is accomplished by requiring licenses to fish and by controlling the size of fish harvested, the season when fishing may be conducted, and the equipment and methods which may be used for fishing. Enforcement efforts for these programs, however, have been largely ineffective.

An NMFS official told us that, except for exports, all food prices are set low by the government to encourage consumption. The official added that domestic fish prices have not changed in about 10 years.

IMPORTS AND EXPORTS

Between 1969 and 1973 imported fish did not represent more than 1 percent of the quantity used domestically. These imports came primarily from Iceland and Iran.

Before 1959, according to NMFS, the Soviet Union had imported a greater quantity of fish products than it exported. In 1959 this situation was reversed and in recent years the quantity of exports has been increasing. Between 1969 and 1973 seafood exports increased by 34 percent. This increase was entirely due to exports of fresh, chilled, and frozen fish.

Large quantities of seafood exports, mostly fresh or frozen fish, are sold to African nations. The more valuable seafoods such as crab, caviar, and other canned fish are sold to European nations. NMFS expects that Soviet seafood exports will be expanded after the Soviet per capita consumption goal is reached.

Fish meal is the only significant nonfood fishery export; nearly all of this goes to Cuba.

ECONOMIC ROLE OF THE FISHING INDUSTRY

An NMFS official told us that the fishing industry makes only a minor contribution to the Soviet Union's national and local economy. The industry does, however, provide important contributions to the nation's food supply and balance of trade.

In April 1975 the Congressional Research Service reported that the Soviet Union's need for protein foods has prompted growth in the Soviet Union's fishing industry. The Congressional Research Service estimated that fish products account for about one-third of the Soviet animal protein diet and about one-fifth of all protein consumption.

As shown in the following table fish products represented 8.3 percent of the value of all food produced in the Soviet Union in 1975.

Soviet workers in fish processing plants are generally paid an hourly wage and bonuses when production quotas are exceeded. Current information is not available on either the number of employees or the average wage paid to workers in processing facilities.

DOMESTIC USE OF FOOD PRODUCTS

According to the Food and Agriculture Organization Yearbooks, the Soviet Union had available 10.4 billion pounds of processed fish in 1973. About 9.2 billion pounds processed fish[1], or 89 percent, was used for food and the remainder was used for other purposes.

Most of the seafood was fresh, chilled, or frozen (64 percent). The remainder was either canned (19 percent), dried salted, or smoked (17 percent). Fish products not used for food were primarily used for fish meal.

From 1969 through 1973 demand for fish products increased rapidly. Soviet production of seafood increased by about 21 percent; production of nonfood fish products increased by about 41 percent.

In 1973 per capita fish consumption was about 35 pounds (about three times higher than U.S. per capita consumption). The Soviet government had established a per capita consumption goal of between 44 and 48 pounds to be reached by 1975. NMFS estimates this goal will be reached by 1977 or 1978.

Failure of the Soviet Union to meet its 1975 goal for per capita fish consumption may have been caused in large part by an inadequate distribution system for processed fish products. The Soviet Ministry of Domestic Trade is responsible for marketing finished fish products. According to NMFS this ministry is unable to provide the high level of marketing technology required to sell frozen fish which represents about 50 percent of sales. A Soviet fishing official concluded that the Ministry of Domestic Trade wholesale centers should do more than merely transfer processed fish from ship to shore. He recommended establishing permanent areas for marketing the products and establishing new and larger processing enterprises under the various wholesale centers.

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[1]Data was not available on the production of herring or miscellaneous fish products (fresh or chilled).

APPENDIX IV

Species grouping	Pounds (billions)	Percent of Total
Cod (includes pollock, hake, and haddock)	7.8	41.0
Herring (includes sardines and sprat)	2.5	13.1
Jacks (includes jack and horse mackerel and chinchards)	1.8	9.5
Redfish (includes grunt, seabream, and ocean perch)	1.5	7.9
Mackerel (includes Atlantic and chub mackerel and cutlass fish)	1.4	7.4
Total	15.0	78.9
All others	4.0	21.1
Total	19.0	100.0

The five major specie groupings shown in the table have represented about 75 percent of the total Soviet catch from 1969 through 1973. During this period cod was consistently the major specie harvested.

PROCESSING FACILITIES

Large and self-sufficient fishing vessels permit the Soviet Union to process many of its fish products at sea. New trawler classes introduced in the 1970s will significantly increase the fleet's processing capability. Processing lines on newer ships are able to produce canned, frozen, salted fish, and nonfood fish products. These trawlers are more automated and provide greater refrigeration and storage space.

Available information concerning onshore processing facilities is outdated. It does indicate a continuing trend toward greater automation particularly for the canning and salting operations.

NMFS feels the growth in the Soviet Union's Atlantic catch has peaked because new quotas have been established by the International Commission for the Northwest Atlantic Fisheries. During a September 1975 meeting, the Commission reduced the 1976 catch quotas in U.S. waters by 1.4 billion pounds, a 22-percent decrease. Quotas were established to protect haddock, mackerel, herring, and flounder. Flounder is the only one of these species not extensively fished by the Soviet fleet.

The United States and Canada also have acted unilateral ly to protect fishery resources from Soviet exploitation. The United States limits Soviet access to major shipping ports. Soviet fleets are allowed a maximum of four port call a month at four Atlantic coast ports and are permitted entry to other ports only for humanitarian reasons. Canada has initiated new fishing quotas calling for a 40-percent reduction in fish taken by the Soviet Union from its coastal waters.

Furthermore, South American and African nations limit foreign fishing activities off their coasts to protect fish resources against extensive Soviet fishing.

SIZE AND COMPOSITION OF THE HARVEST

The Soviet Union is the world's second largest fish harvester and is expected to become the largest harvester sometime between 1977 and 1980. The Soviet harvest has been increasing at a much faster rate than the worldwide harvest. From 1950 to 1973 the Soviet harvest increased at an average annual rate of 17.9 percent. During the same period the world catch increased at an average annual rate of 6.7 percent. The Soviet catch represented 14 percent of the world catch in 1973. The following table shows the species groupings which represented the Soviet harvest for 1973.

Wages earned by Soviet fishermen are often two or three imes higher than the average Soviet worker's salary. In 975 deck hands could earn up to $600 a month while the verage Soviet worker earned less than $200 a month. Soviet ishing vessel captains are paid over $1,000 monthly.

Productivity is a basic factor used in determining the age paid to a member of the fishing industry. Other factors, uch as location and duration at sea, are also considered. here are more than 20 manuals and handbooks dealing with age computation for fishermen. In 1972 a Soviet labor of- icial said that the system for determining wage rates in the ishing industry is more complicated than in any other Soviet ndustry.

AJOR FISHING AREAS

Industrial pollution and overfishing within Soviet oastal waters have necessitated fishing operations on the igh seas which, according to NMFS estimates, accounted for ver 90 percent of the Soviet Union's 1975 catch. In 1950 he Soviet fleet had to travel about 200 miles to reach good ishing grounds. This distance increased to over 4,000 miles n the late 1960s.

The major Soviet fishing grounds include the Atlantic, ndian, and Pacific Oceans, the Azov and Black Seas, and oviet inland waters. The primary areas are in the Atlantic nd Pacific where the harvest about doubled between 1964 and 973. The following table shows distribution of the harvest y fishing areas in 1964 and 1973.

ishing area	Billions of pounds		Percent of total	
	1964	1973	1964	1973
tlantic Ocean	4.6	10.1	46.4	53.1
acific Ocean	3.2	6.3	32.2	33.2
ndian Ocean	(a)	0.1	0.1	0.5
nland waters, including the Caspian Sea	1.6	1.9	16.2	10.0
zov and Black Seas	0.5	0.6	5.1	3.2
Totals	9.9	19.0	100	100

Less than 100 million pounds.

For example, more than one-half of the Soviet vessel tonnage consists of support vessels. In contrast, the tonnage of Japanese support vessels represents only about 20 percent of its fleet.

NMFS attributes Spain's low productivity to its large numbers of vessels in distant waters. Conversely, the high productivity of Norway and the United States is attributed to the fact that these nations fish from homeports and do not require numerous support vessels.

OWNERSHIP, EMPLOYMENT, AND WAGES

The fishing industry is composed of state fisheries and fishermen cooperatives. Both are owned by the Soviet government and are subject to government policies. State fisheries are the basic form of ownership in regions of the country where a labor force was once unavailable and it was necessary for the government to transport workers to the area. Also, state fisheries are usually established when large capital investments are required or when new fishing methods and vessels are introduced.

Cooperatives once accounted for the greatest part of the Soviet catch but have become increasingly less important Current statistical data showing the catch of state fisherie and cooperatives is not available. Data through 1968 is provided below.

	Percent of harvest		
Year	State fisheries	Cooperatives	Total
1940	44	56	100
1950	47	53	100
1960	70	30	100
1965	77	23	100
1968	74	26	100

The number of fishermen has remained relatively stable while the Soviet harvest has increased considerably. This is because the Soviet fleet has been expanded and automated. In 1975 an estimated 750,000 people were employed in the fishin industry representing less than 1 percent of the total Sovie employment. The number of fishermen in 1974 was estimated to be between 200,000 and 250,000 people--about the same number as was estimated for 1913.

APPENDIX IV

Soviet efforts to increase high seas fishing have been successful. In 1950, 46 percent of the Soviet catch came from the high seas and 91 percent in 1975.

Likewise, efforts to develop more efficient fishing vessels have been successful. The number of fishermen in 1974 was about the same as it was in 1913 yet the 1974 harvest was about nine times greater than the 1913 harvest. Moreover, the fleet is becoming even more efficient and is requiring less labor. For example, in 1974 the Soviet Union introduced a trawling system which permits alternate operation of two trawls so that no time is lost in handling and resetting fishing nets; as one net is hauled, the other is set. NMFS projects that through 1980 the Soviet Union will continue to modify and expand its fleet, emphasizing large fishing and support fishing vessels.

An indicator used by NMFS to measure the productivity of fishing fleets is the ratio between the catch and the gross registered tons of the vessels. Using this indicator, NMFS shows that of the five nations having the largest fishing fleets in 1973, the Soviet Union's fleet ranks last in productivity. The following table illustrates this.

Country	Catch (pounds harvested per gross ton of vessel)
Norway	32,628
United States	16,645
Japan	15,609
Spain	6,900
Soviet Union	2,910

Using the same productivity measure, the fishing fleets of all remaining fishing nations, as a group have a productivity level about nine times greater than that of the Soviet fleet.

Regardless of the merit of the productivity measure used by NMFS, the Soviet Union's low catch per gross vessel ton highlights a weakness in its fishing method. Remaining at sea for extended periods increases the number of non-fishing support vessels required to service the fishing fleet.

	Pounds (millions)	United States dollar equivalent (note a)
Whitefish (cod, haddock, saithe, plaice)	1,412.1	$292,535,000
Herring	329.0	31,551,000
Other fatty fish (sprats, mackerel)	256.2	10,025,000
Shellfish	140.6	27,025,000
Total all fish	2,137.9	$361,136,000

a/Because it was our desire to present monetary data in terms of dollars, and for consistency, we selected a conversion rate of 1 pound to $2.35 (average rate 1974) and applied it throughout the United Kingdom profile.

Cod, herring, haddock, sprats, and saithe, the five most important species, constitute approximately 70 percent of the United Kingdom's total fish catch.

PROCESSING FACILITIES

There are about 800 to 1,000 wholesale merchants buying fish at the numerous ports located throughout the United Kingdom. The ports are staffed by two or three to several hundred people. The nature of the work varies from filleting and packing to the production of frozen, smoked, or canned products.

Most of the smaller firms are family businesses or partnerships. They usually have stands on or close to the market floor where their purchases are filleted and packed in ice in nonreturnable containers for distribution to inland wholesalers and retailers.

Medium-sized firms primarily cut and package chilled fillets, or smoke-cure the fish. In recent years many independent, medium-sized businesses have been taken over by larger processing plants. Many of these plants are company-run and often belong to a chain of factories. Precise figures are not available but probably well over half the United Kingdom's catch is processed by the five largest groups.

Frozen fish may be moved from the producer's own cold storage to a public one at or near the port, and from there to an inland cold storage, or it may be sold directly from the port. Apart from some transport by rail, almost all fish is distributed by truck.

DOMESTIC USE OF FISH PRODUCTS

Fish may reach the consumer by a variety of routes. The port merchant may send the fish directly to a retailer or caterer, he may send it to an inland wholesale market, or he may have his own inland depot for local distribution.

The price of fish reflects the market condition more than the fishermen's costs. The price per pound the customer pays is on the average four times the price per pound the fisherman receives. The processing and distribution phase account for the difference.

Nearly all fresh fish is sold at auctions normally conducted by the trawler firms or by an agent employed by them. Fish frozen at sea and chilled fish from vessels that have signed an agreement with a processing firm to take some or all of their catch are usually sold by contract.

Herrings are sold by auction after a sample of the vessel's catch has been inspected. Some shellfish, notably Norway lobsters, may be put up for auction but a large portion of the catch bypasses the auction and is sold directly by private bargain to the processor or distributor.

Most of the British catch is chilled, frozen, smoked, or canned for human consumption. Consumption of fish in the United Kingdom has steadily decreased. Before the Second World War, per capita consumption was 26 pounds, but in the 1960s the figure was down to 20 pounds. Consumption was under 18 pounds including 2 pounds of imported canned fish, during the mid-1970s. Comparable figures for other protein foods are: 117 pounds of meat, 15 pounds of poultry, 35 pounds of eggs, 55 pounds of milk, and 13 pounds of cheese. A little more than 4 percent of the household food expenditure is spent on fish. According to the Organization for Economic Cooperation and Development Review of Fisheries, the estimated use of the 1974 United Kingdom fish catch was:

	Percent
Fresh, chilled	53.6
Frozen	27.5
Cured (salted, smoked)	4.1
Canned	.5
Reduced to meal/oil	13.5
Miscellaneous purposes	.8

Roughly 70 percent of the whitefish catch is chilled, with the remainder frozen. About half the herring catch is for kippers or kipper fillets, and only small amounts of chilled herring are sold in the United Kingdom.

The shellfish catch is often sold to local hotels and holiday resorts. Some of the more important species like the Norway lobster are processed for exports as shelled frozen meat.

The principal by-products made from fish are fishmeal for animal feeding, and fish oils used mainly in manufacturing margarine and cooking fat. During 1974 United Kingdom and foreign vessels landed about 187.4 million pounds of Norway pout and sandeels for industrial purposes. In addition, approximately 114.6 million pounds of unsold edible fish were reduced for use in industrial products.

IMPORTS AND EXPORTS

The 1974 fish imports to the United Kingdom decreased slightly from 1973. The most important import commodities were chilled cod and plaice, frozen fillets of cod, frozen and canned salmon, canned pilchards and sardines, and frozen and canned shrimps and prawns. The United Kingdom also imported large quantities of fishmeal.

Exports from the United Kingdom have tripled in the past 10 years for all fish products except canned fish. Shellfish exports in particular have risen rapidly in the seventies. However, the total amount of fish exports is not outstanding in terms of total fish caught--about 16 percent.

Edible fish exports also declined in 1974. Fresh, chilled, and frozen fish accounted for approximately 64 percent of the fishery exports, followed by semipreserved--21 percent, those in air-tight containers--8 percent, and shellfish--7 percent.

The Netherlands received the greatest amount of United Kingdom exports--about 17 percent and the United States received about 7 percent.

ECONOMIC ROLE OF THE FISHING INDUSTRY

Specific information regarding the importance of the fishing industry to the national economy was not readily available. Indications are, however, that the fishery industry is relatively small compared to other United Kingdom industries. In terms of employment, there are only about 23,000 fishermen. In total, about 100,000 people are involved in the United Kingdom fishing business, catching, processing, marketing, and distributing fish products to 55 million potential customers.

GOVERNMENT ROLE IN FISHERIES

According to an official of the British Ministry of Fishing, the general policy of the United Kingdom government prior to 1970 was to supply food to the consumer at the lowest possible price. The government was also intent on keeping the fishing industry visible, thus supporting the industry for both social and economic reasons.

This policy changed during the 1970s. The government now feels that more consideration should be given to fish conservation, an area which has received little attention in the past. Also, more emphasis is being placed on improving the fishing capability of the inshore domestic fleet.

The Ministry of Agriculture, Fisheries, and Food is responsible for fisheries in the United Kingdom, including England and Wales. Scottish fishery matters are the responsibility of the Department of Agriculture and Fisheries for Scotland. The fisheries branch of the Ministry of Agriculture manages fishery affairs in Northern Ireland. The fishery departments are generally concerned with the formulation of United Kingdom fisheries policy in national and international affairs, the regulation and inspection of marine and freshwater fisheries, financial and technical aid to the industry, and the management of fisheries research.

Another fishing organization, The Herring Industry Board, has powers to regulate the fishery for herring, to sponsor research and development work aimed at improving the herring industry, to develop markets and provide publicity for the herring and its products, and to provide financial assistance. The White Fish Authority has a similar role to play for the whole of the sea fishing industry apart from the herring fishery, and has its own industrial development unit to provide a wide range of technical services. Both have a number of common interests, and their administrations

share a headquarters in Edinburgh, Scotland. These two organizations provide an important link between the Government fishery departments and the industry they serve.

Support programs

According to the White Fish Authority, operational subsidies were introduced in the beginning of 1975 to last for a 6-month period. This was done to avoid a radical reduction in the fishing fleet. Subsidies were in the form of flat rate, daily payments apportioned according to vessel size; the larger the vessel, the greater the flat rate. The total subsidy was estimated at $14,688,000. From April 1974 to April 1975 the government also approved 14,732 grants totaling $123,941,000, and 2,837 loans totaling $103,414,000. These loans and grants could be used for purchase and initial outfitting of new boats, purchase of second hand boats, improvements, reconditioning, and new motors.

Research programs

The principal Government fisheries research stations are the Fisheries Laboratory at Lowestoft, the Marine Laboratory and the Terry Research Station both at Aberdeen. The Fisheries Laboratory at Lowestoft is concerned with the study of marine fish resources, their viability and conservation, and methods of catching fish. Branch laboratories at Burnham on Crouch and at Conway are primarily concerned with inshore and shellfish research. The Marine Laboratory in Aberdeen provides similar research support for Scottish fisheries. Terry Research Station, together with its branch in Hull, the Humber Laboratory, provides facilities for studying problems related to the handling, processing, and distribution of fish as food. Freshwater fishery research is done by the Salmon and Freshwater Fisheries Laboratory in London, who have a branch at Weymouth concerned principally with fish diseases; the Scottish counterpart is the Freshwater Fisheries Laboratory at Pitlochry.

Management programs

Several officials we interviewed in the United Kingdom mentioned the inadequacy of current conservation measures. They affirmed that quota agreements which have been the basis of international catch control are ineffective. Industry spokesmen stated that, although the United Kingdom has abided by the quotas and gear restrictions imposed by the Common Fisheries Policy of the EEC, they feel other EEC members have

violated the agreements. This was attributed to the lack of penalties and enforcement; violators were simply reported to their respective countries.

Government officials, as well as industry officials, indicated that there is a need for effective conservation. The conservation measures should include:

--Prohibiting, in certain waters, fishing with the intent to reduce the catch to fishmeal.

--Adopting an effective quota system to insure regular harvests. This in turn, should lead to the development of an exclusive economic zone and exclusive waters for fishermen who have a direct interest in conserving migratory stocks.

--Implementation of an effort limitation (expressed in vessel days on the fishing grounds) in specific geographic areas, coupled with random inspections of mesh sizes. This should be tied to scientifically assessed stock levels.

WEST GERMANY

PRESENT SITUATION AND TRENDS IN THE WEST GERMAN FISHING INDUSTRY

In an effort to make the fishing industry more efficient and competitive, West Germany implemented a fleet modernization program. However, with some coastal countries extending their territorial limits and international fishery management commissions limiting the amount of fish that may be caught, its modern long distance fleet is underutilized. West Germany's deep-sea fleet in 1974 harvested only 180.8 million pounds of fish, although its 40 trawlers have the capability of catching 220.5 million pounds per year. Likewise, the freezer trawlers produced only 167.5 million pounds of frozen fillets in 1974, although they have the capability to produce 264.6 million pounds per year. The four trawler companies making up the deep-sea fleet all suffered losses in 1974 and 1975.

The long distance trawler fleet is being forced to shift from its traditional fishing grounds to new grounds as a result of increasing restrictions by coastal states. Over the past 5 years the shift in catching activities in the North Atlantic has been away from the North American coast and toward Norway. West Germany recognizes her dependence on international developments and the need to protect her right to traditional fishing grounds.

EFFECTS OF EXTENDED JURISDICTION

As coastal countries establish extended territorial zones (200-mile limits), West Germany will try to have the limits of the zones and authorities of the coastal states precisely defined in international law so that objective enforcements can be made. Within this arrangement, West Germany will try to negotiate joint ventures under which its modern fleet can be utilized for the benefit of coastal states which do not have such capabilities, in exchange for the right to take some of the catch back to the West German market. West Germany feels that such an arrangement could be made with the United States, expecially in view of U.S. difficulties in manning a modern deep-sea fleet and the failure of a recent U.S. venture into deep-sea freezer trawling. West Germany also sees the possiblility of agreements with the United States for the exploitation of fish not harvested by the United States, such as hake off the Pacific Coast.

In summary West Germany views the degree of exclusiveness of the extended economic zones as the key factor in determining the future of its fishing industry. The Government is committed to supporting the industry to the extent necessary to maintain a domestic market share and the existence of the secondary sector of the industry which is an important econcmic base in the coastal states.

STRUCTURE OF THE FISHING FLEET

The West Germany fishing fleet is based primarily in the four main ports of Bremerhaven, Cuxhaven, Hamburg, and Kiel. The structure of the fleet in terms of vessel types and numbers has been changing over the past few years. With the assistance of Government programs, including interest subsidies, loan guarantees, and scrapping premiums, many older, smaller vessels have been withdrawn, and a few larger more modern ones added. The composition of the fleet at the end of 1974 totaled 2,563 vessels consisting of 74 deep sea trawlers, 7 luggers, 794 fish and shrimp cutters, and 1,688 coastal fishing craft.

The deep-sea trawler fleet decreased from 110 in 1971 to 72 by the end of 1975. The lugger fleet decreased from 14 to 7 by the end of 1974, while the cutter fleet dropped from 958 to 794 during the same period. The coastal fleet also experienced a decrease in the number of fishing boats.

The average age of the deep sea trawlers is 10 years. About 71 percent of the fish cutters are over 20 years old compared to 34 percent of the shrimp cutters. The seven luggers range from 15 to 19 years old.

Of the 74 deep sea trawlers, 32 vessels are classified as full freezers and 42 as wet fish trawlers. All except 14 of the vessels are stern trawlers. Sixty-two vessels of the trawler fleet have fishmeal plants on board.

Age and Size Groups of the Deep-Sea Trawler Fleet
December 31, 1974

Gross registered tons (GRT)	Number	Percent	Age in years: Under 5	From 5 to 9	From 10 to 14	From 15 to 19
650 to 999	34	45.7	0	3	21	10
1,000 to 1,999	16	21.8	1	10	5	0
2,000 to 2,999	11	14.9	0	9	2	0
3,000 to 3,599	13	17.6	13	0	0	0
Total	74	100.0	14	22	28	10
Percent of vessels in age groups:			18.9	29.7	37.8	13.5

OWNERSHIP, EMPLOYMENT, AND WAGES

The ownership of the entire deep-sea trawler fleet is divided among four private companies, three of which are subsidiaries of multinational firms. The four companies are organized into an association and are encouraged and regulated under German cartel law. The remainder of the fleet, including cutters, luggers, and coastal fishing craft, are mostly independently owned and operated. The owners of cutters and luggers are members of cooperatives, some of the cooperatives being the equivalent of producer organizations.

The number of crew members employed in the fleet totaled 5,758 as of September 30, 1974; it was 5,948 the previous year. This number includes 1,221 owners and charterers, 891 hired officers, and 3,646 others, such as deck hands, cooking and service personnel, machine operators, and fish processing workers.

The wage rates of workers on the deep-sea trawlers are negotiated between the employees' unions and the trawler companies and average about $3 per hour. The wage rates consist of a base rate plus a certain bonus based on the fish catch. In the remainder of the fleet the predominant basis of wage determination is a percent of the catch proceeds as agreed to by the vessel operator and the workers.

Closely related to employment aboard vessels is the employment of workers to unload the fishing vessels. At Bremerhaven, the largest of the four major fishing ports, about

150 workers are employed by the port for this purpose. These workers are paid at a piece rate with a guaranteed minimum equivalent to earnings of the prior year.

MAJOR FISHING AREAS

The North Sea continues to be the most important fishing area for the coastal fleet, accounting for 77 percent of that fleet's catch in 1974. In distant waters the fishing area around Iceland has been the most important, although its importance is declining with a general shift to other distant fishing areas. On the basis of total catch, Greenland, New England, Nova Scotia, and Iceland are decreasing in importance, while the Faroe Islands, Norway, and the Barents Sea are becoming more important. In 1974 less than 4 percent of the long distance fleet's effort was devoted to fishing off New England.

SIZE AND COMPOSITION OF THE HARVEST

The total catch of the West German fishing fleet in 1974 was 1.1 billion pounds, valued at $206 million.[1/] The 1974 catch represented an increase of 8.2 percent in tonnage caught and 22.5 percent in value over the 1973 catch.

The most important species caught in 1973 and 1974 were cod, salmon, herring, and Atlantic redfish (ocean perch). These species made up 74 percent of the catch in 1973 and 70 percent in 1974.

The total 1974 landings were about 3.5 percent below the average of the previous 5 years. Production of the deep-sea trawler fishery increased by 10.9 percent, showing the effect of the catching capacity of the new full freezers. Fresh fish landings by the trawlers showed only small differences. In the coastal and medium water fisheries the production increased by only 4 percent.

PROCESSING FACILITIES

The fish processing industry in West Germany is located mainly in the four major fishing ports. The processors

[1/] For purposes of consistency we selected a conversion rate of 2.53 DM to $1 (official rate April 1976) and applied it throughout the West Germany profile.

operate to a large extent out of buildings leased from the respective fishery port authorities. The fresh fish are processed in facilities adjacent to the auction halls and by early afternoon the first products are in route inland by truck or rail.

Frozen fish from the factory ships are unloaded and put into freezer storage at the port, to await final processing and distribution. Information relative to the overall condition of processing facilities was not available, but both the Bremerhaven and Cuxhaven fishery port authorities have had recent additions to processing and freezer storage facilities.

In 1974 over 10,000 persons were employed in the West German processing industry. The largest single processing plant employs about 1,000 persons. However, the size of most individual plants is much smaller; 53 percent of the industry's individual plants have from 10 to 200 employees and 42 percent have from 1 to 9 employees. Approximately 80 percent of the total employment is made up of production workers paid primarily at piece rates. The production workers are mostly foreigners. The average earning of a production worker in 1974 was about $2.85 per hour.

DOMESTIC USE OF FISH PRODUCTS

Total output of the processing industry in 1974 was dominated by marinades (28 percent), frozen products (24 percent), and canned products (22 percent). The remaining 26 percent was made up of smoked products, oil preserves, semi-preserves, shrimp products, fish salads, and other prepared products. Less than 20 percent of the 1974 domestic catch was made into industrial products, namely fishmeal, fish oil, and fish liver oil.

Domestic landings were equivalent to 55 percent of the total supply of fish in the West German market in 1974, compared to 50 percent and 51 percent in the 2 previous years. The remainder of the total supply was made up from imports.

The fish products distribution system in Germany is characterized by a number of distribution schemes. For example, the German cooperative, made up of independently owned and operated fishing enterprises, has a group of 12,000 retail outlets through which it sells a large part of its catch. Another major share of the distribution sector is

controlled by subsidiaries of the same parent companies that own the distant water trawler fleet. Despite this common ownership the processing and distributing subsidiaries operate independently, buying their unprocessed fish wherever the price is best.

Although over 80 percent of the 1974 catch was designated for human consumption, less than one-half of this was actually consumed on the domestic market. Some 110.2 million pounds were used for meal while over 330.7 million pounds of fish and fish products were exported.

The average per capita consumption of edible fish in West Germany was 25 pounds per year in 1970 and is expected to be 30 pounds per year in 1980. The most popular products on the West German domestic market in 1974 were marinades and fillets. The West Germany demand for fishmeal and fish oil is equivalent to six times the domestic producing capability, necessitating substantial imports, primarily from Peru. In 1974 domestic production of fishmeal and oil was 165.0 million pounds, while imports were 1.0 billion pounds.

Minimum prices are set for both fresh and frozen fish. The Association of German Deep Sea Fisheries (owners of the long distance fleet) requires that all fish caught by member companies be sold through the auctions. Cooperatives formed by independent owner/operators have similar agreements. As a result, 90 percent of the wet fish landed in West Germany is sold through the auctions. If the minimum established price cannot be obtained the fish goes to the fishmeal factory. The price obtained from the fishmeal factory is only a small fraction of the minimum auction price and the difference is partially made up by a subsidy program.

The Association of German Deep Sea Fisheries also sets minimum prices for frozen fish and can regulate the quantity of the catch by laying off vessels. The organization's annual plans and price determinations are subject to approval of the West German cartel administration. Retail prices of major fish products increased an average of 10 percent in 1974.

IMPORTS AND EXPORTS

In 1974 45 percent of the West Germany market's fish supply came from imports, primarily fresh herring from Denmark, cured herring products from the Netherlands, and canned tuna mainly from Japan.

As a consequence of its dependence on imports for about 50 percent of the supplies to the domestic market West Germany's import policy has been very liberal. As the second largest importer of fishmeal in Europe West Germany normally grants licenses to feedstuffs importers on application. Further detail on import policies was not provided except that herring imported in butterfly fillet form is subject to lower import duties than full fillets.

The value of fish exports in 1974 was $111,864,030. Ninety-two percent of these exports went to European countries. Exports to the United States represented only about 1.5 percent of total exports.

West Germany - 1974
Value of Leading Exports

Product	Value	Percent of total
	(000 omitted)	
Canned and preserved fish	$ 47,000	42
Iced and frozen fish (excluding herring)	39,295	35
Iced and frozen herring	7,671	7
Other	17,889	16
Total	$111,855	100

West Germany's production of artificial smoked salmon cannot be exported to the United States because the dye does not meet Food and Drug Administration standards. West Germany producers do not export canned herring to the United States because the preferred preserving agent, soybean oil, is subject to heavy duty and using other preservatives results in an inferior product which cannot compete on the U.S. market.

ECONOMIC ROLE OF THE FISHING INDUSTRY

Less than 1 percent of West Germany's economically active population is employed in the fishing and processing

industry. However, the industry plays a significant role in social and economic balances of regional economies, particularly along the coast and in the four major port areas. For example, the small-scale fisheries on the Baltic Coast are indispensable factors in diversifying local employment and in utilizing the inshore resources.

The following table shows West Germany's international trade in fishery products in 1974.

West Germany - 1974
Trade in Fishery Products

	Fishmeal, fish oil, and solubles	Edible fish and fish products	Total
	(000 omitted)		
Exports	$ 46,740	$111,864	$158,604
Imports	207,550	309,169	516,719
Balance	-$160,810	-$197,305	-$358,115

The fish processing industry contributed 742.8 million pounds of finished product to the domestic food supply in 1974.

GOVERNMENT ROLE IN THE FISHING INDUSTRY

In recent years West Germany has pursued a policy of modernizing and restructuring its fishing fleet with the objective of being able to provide enough fish to (1) maintain the existing processing industry and therewith the employment and (2) maintain a large enough share of the West Germany market to avoid being subjected to the world market fluctuations because of over reliance on imports.

The official policy aim now is to insure for the West Germany consumer a sufficient supply of good quality fish at reasonable prices. In view of increasing restrictions on fishing in traditional grounds, West Germany is interested in making agreements with other countries such as the United States to continue fishing the other countries' waters.

In West Germany the government involvement in fisheries occurs at both state and federal levels. The two federal bodies involved in fisheries are the Department of Fishery Policy within the Ministry of Food, Agriculture, and Forestry in Bonn, and the Fishery Research Board in Hamburg. At the state level the four coastal states each operate a fishery port and are generally responsible for implementing fishery policy and programs established at the federal level.

The Ministry of Food, Agriculture, and Forestry is considered to be a medium-sized agency, having 700 civil-servant employees. The larger Ministries of Defense and Finance each have 2,000 employees. The Ministry of Food, Agriculture, and Forestry has a budget of about $3.2 billion, with the Department of Fishery Policy receiving about $19 million. Even though the fisheries budget is small relative to the total budget there is considerable support for fisheries in the parliament and from the general population, particularly from the representatives of the coastal states.

The programs for fisheries include operation of a six-vessel fishery protective service which provides weather service, medical care, and technical assistance to the fleet, operation of three research vessels and on-shore research, capital assistance for fleet modernization, and a seamen's social security program.

Financial subsidy program

The measures of assistance and support by the West Germany Federal Government and the Laender (provinces) to improve and strengthen the economic structure of sea fisheries are limited to capital assistance because EEC rules prohibit member countries from giving operating subsidies. To overcome the substantial cost increases resulting from the energy crisis, the Federal Government gave aid for structural and consolidation measures to the extent of $5.9 million (a measure restricted to 1974 only). This special assistance enabled the industry to continue its catching operations at its previous level and prevented the collapse of individual enterprises, in particular cutter fisheries.

Including the above assistance the Government made available in its 1974 fiscal year a total of $17.2 million, which was used as follows:

Loans for the small deep-sea and coastal fisheries	$ 1,313,597
Interest reduction on money market loans to promote the construction of combined fishing factory vessels and cutters and the modernization of fishing vessels	2,424,901
Loans for new construction in the large deep-sea fisheries	5,533,597
Structure and consolidation support:	
Scrapping premiums for vessels	976,488
Grants for certain kinds of reconstruction of vessels (deep-sea trawlers and deep-sea herring fisheries) and for the construction of new vessels (cutters)	1,049,323
Total	11,297,906
Special structure and consolidation support	5,928,854
Total	$17,226,760

Under the EEC price stabilization program, subsidies may be provided to producer organizations. For example, when fish cannot be auctioned at the minimum price and are sent to the fishmeal plant the producer receives an EEC subsidy which partially recovers the difference between the very low fishmeal plant price and the established minimum price.

Research programs

The Federal Research Board for Fisheries, in Hamburg consists of the Institute for Sea Fishery, the Institute for Coastal and Freshwater Fishery, the Institute for Fishing Technique, and the Institute for Biochemistry and Technology. The Board also has laboratories at Bremerhaven, Cuxhaven, and Kiel. The Research Board has 146 permanent employees on its staff and 9 scientists and 17 technical employees working under special research contracts. A related organization, the Biological Station at Helgoland, has a staff of 97 permanent employees.

Three research vessels are in service. In addition, privately owned deep-sea trawlers have been chartered by the government to carry out exploratory fishing in new fishing grounds.

The research work of both the Institute of Sea Fishery and the Institute for Coastal and Freshwater Fishery studies biological control of commercial fish populations, fluctuations in stock size, seasonal movements and their influence on the fishing yield, and the exploration of new fishing grounds. The main task of the Institute for Fishing Technique is to improve existing fishing techniques and to develop new ones. The Institute for Biochemistry and Technology works to improve the quality and storage life of fish and fish products.

The West Germany Deep Sea Trawler Association works closely in cooperation with the federal agencies in developing the working program of their research vessel Walter Herwig, which is used in investigations of fishing techniques, new grounds, and handling and processing the catch at sea.

Management programs

The West Germany Federal Government favors fish conservation, citing its own past and ongoing research efforts in fish stock management for the general benefit of all fishing countries. Despite the threat to her own fishing interests, West Germany believes that establishment of 200-mile limits by coastal states will result in better management and conservation of fish stocks. West Germany officials feel that fish stock protection measures taken by Fishery Commissions have generally been too weak and too late.

West Germany's own territorial waters are relatively limited and actually fall within the jurisdiction of the Baltic Sea Fisheries Commission and the Northeast Atlantic Fisheries Commission. West Germany is a member of both of the foregoing commissions and also of the International Commission for the Northwest Atlantic Fisheries.

In addition to membership in the international commissions, West Germany has agreements with several other countries. For example, in 1974 it made an agreement with Poland which allows West Germany cutters to fish for salmon in Polish waters outside a limit of 6 nautical miles. It has also held talks with Norway, Mexico, Canada, and the United States concerning future cooperation in fisheries.

APPENDIX IV

Domestic fishery management policy is set forth in plans and regulations by the Federal Government but the implementation and endorsement are left to the four coastal states. These states also have their own policies concerning fisheries. No institutional arrangement exists for coordination of policies among the four coastal states, although regular meetings are held. The responsibilities of the coastal states include enforcement of processing regulations concerning quality and sanitation, and auditing of fishery enterprises which apply for Government assistance. At present, fishing vessels are not required to be licensed but are required to maintain precise log books recording their activities and location. The Government anticipates that licensing may become necessary in the future due to the increasing use of quotas to control fish catch.

APPENDIX V

TOTAL FISH CATCH BY COUNTRY, REGION, AND YEAR OFF U.S. COASTLINE
(METRIC TONS)

	ATLANTIC-NORTH					ATLANTIC-SOUTH AND GULF					PACIFIC					ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Bulgaria	7,338	44,892	39,775	107,291	29,548	--	--	--	--	--	--	--	--	--	--	7,338	44,892	39,775	107,291	29,548
Canada	49,438	70,356	52,441	52,199	62,187	--	--	--	--	--	2,800	2,600	4,600	7,600	6,251	52,238	72,956	57,041	59,799	68,438
Cuba	--	1,150	1,557	--	--	--	--	--	--	--	--	--	--	--	--	--	1,150	1,557	--	--
DDR (East Germany)	53,386	106,885	139,775	150,853	95,483	--	--	--	--	--	--	--	--	5,300	1,246	53,386	106,885	139,775	156,153	96,729
France	--	--	803	3,623	3,832	--	--	--	1,200	--	--	--	--	--	--	--	--	803	4,823	3,832
FRG (West Germany)	92,842	59,961	32,888	38,280	26,760	--	--	--	--	--	--	--	--	--	--	92,842	59,961	32,888	38,280	26,760
Italy	--	--	4,000	3,915	4,680	--	--	--	1,000	--	--	--	--	--	--	--	--	4,000	4,915	4,680
Japan	29,569	27,891	28,819	32,899	25,798	10,200	12,600	4,800	3,400	9,118	1,492,800	1,270,200	1,479,500	1,058,900	1,170,688	1,532,569	1,310,691	1,513,119	1,095,199	1,205,604
Poland	147,121	219,867	206,674	190,563	152,890	--	--	--	--	--	23,500	34,500	52,100	50,900	90,951	170,621	254,367	258,774	241,463	243,841
Romania	2,720	8,714	5,344	7,142	9,890	--	--	--	--	--	--	--	--	--	--	2,720	8,714	5,344	7,142	9,890
Spain	8,163	13,416	20,002	22,195	24,247	--	--	--	--	--	--	--	--	--	--	8,163	13,416	20,002	22,195	24,247
UK	--	--	--	--	666	--	--	--	--	--	--	--	--	--	--	--	--	--	--	666
USA	985,304	965,684	955,589	1,060,578	1,016,698	1,016,300	1,188,500	950,400	886,200	1,002,433	709,700	615,200	639,700	637,900	659,379	2,711,304	2,769,384	2,545,689	2,584,678	2,678,510
USSR	268,509	406,714	488,993	451,480	351,420	--	11,200	73,800	8,900	25,600	767,800	657,900	882,100	517,900	723,500	1,036,309	1,075,814	1,444,893	978,280	1,100,520
TOTAL	1,644,390	1,925,530	1,976,660	2,121,018	1,804,099	1,026,500	1,212,300	1,029,000	900,700	1,037,151	2,996,600	2,580,400	3,058,000	2,278,500	2,652,015	5,667,490	5,718,230	6,063,660	5,300,218	5,493,265

Note: Exclusive of Portugal, Republic of China (Taiwan) and Republic of Korea (South Korea)
Source: FAO

APPENDIX V

TOTAL FISH CATCH BY SPECIES OFF U.S. COASTLINE
(METRIC TONS)

SPECIES	ATLANTIC-NORTH					ATLANTIC-SOUTH AND GULF					PACIFIC					ALL AREAS TOTAL	ALL AREAS TOTAL	ALL AREAS TOTAL	ALL AREAS TOTAL	ALL AREAS TOTAL
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	2,375	3,505	19	11	--	--	--	--	--	--	186,200	151,000	105,500	96,900	88,821	188,575	154,505	105,519	96,911	88,821
Tuna	3,583	3,651	1,900	1,655	1,178	1,700	1,300	200	300	289	243,800	211,300	244,200	228,100	232,354	249,083	216,251	246,300	230,055	233,821
Capelin	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--
Smelts	1,433	7,352	32,739	2,554	19,726	--	--	--	--	--	900	1,000	1,100	1,000	1,000	2,333	8,352	33,839	3,554	20,726
Herring	348,519	355,637	243,934	243,078	204,424	3,400	6,000	10,700	5,200	3,036	152,300	59,800	77,300	95,100	47,261	504,219	421,437	331,934	343.378	254,721
Spanish Sardine	--	--	--	--	--	200	8,900	9,700	300	300	--	--	--	--	--	200	8,900	9,700	300	300
Calif. Sardine	--	--	--	--	--	--	--	--	--	--	200	100	200	100	6	200	100	200	100	6
Menhaden	223,426	240,751	329,773	60,864	257,378	610,400	774,900	548,600	525,500	648,722	--	--	--	--	--	833,826	1,015,651	878,373	586,364	906,100
N. Pac. Anchovy	--	--	--	--	--	--	--	--	--	--	87,500	40,800	68,000	104,000	115,041	87,500	40,800	68,000	104,000	115,041
Halibut	245	141	110	89	76	--	--	--	--	--	33,000	27,900	33,500	12,300	21,598	33,245	28,041	33,610	12,389	21,674
Sole/Flounder	63,546	58,780	61,928	52,309	41,867	2,500	2,100	2,700	3,300	5,031	233,900	265,700	210,200	187,000	171,889	299,946	326,580	274,828	242,609	218,787
Cod	35,241	37,509	33,661	36,871	36,826	--	--	--	--	--	109,000	101,300	64,500	32,100	58,562	144,241	138,809	98,161	68,971	95,388
Hake	68,528	157,370	194,852	206,085	167,425	--	--	--	--	--	171,300	183,100	119,600	163,500	205,773	239,828	340,470	314,452	369,585	373,198
Haddock	12,852	12.168	6,670	5,892	5,121	--	--	--	--	--	--	--	--	--	--	12,852	12,168	6,670	5,892	5,121
Pollack	7,659	14,633	13,013	13,076	12,393	--	--	--	--	--	--	--	--	--	--	7,659	14,633	13,013	13,076	12,393
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	1,098,000	943,800	1,430,800	689,800	1,155,955	1,098,000	943,800	1,430,800	689,800	1,155,955
Marine Catfish	--	--	--	--	--	200	100	300	100	92	--	--	--	--	--	200	100	300	100	92
Groupers	6,135	4,603	4,605	5,975	4,772	3,900	3,700	4,100	3,400	3,585	--	--	--	--	--	10,035	8,303	8,705	9,375	8,357
Snappers	--	--	--	--	--	5,100	6,100	5,200	5,000	4,777	100	100	--	200	135	5,200	6,200	5,200	5,200	4,912
Grunts	--	--	--	65	--	300	1,700	53,700	8,200	24,100	94,000	3,100	65,800	146,400	19,711	94,300	4,800	119,500	154,665	43,811
Croakers	3,092	788	6,100	7,505	7,198	13,500	16,200	21,700	22,600	28,034	300	200	200	200	233	16,892	17,188	28,000	30,305	35,465
Atl. Redfish	15,958	20,034	19,102	17,383	10,611	--	--	--	--	--	--	--	--	--	--	15,958	20,034	19,102	17,383	10,611
Pac. Rockfish	--	--	--	--	--	--	--	--	--	--	135,100	137,900	145,200	116,600	93,609	135,100	137,900	145,200	116,600	93,609
Mackerel	204,978	349,544	387,737	381,238	294,962	8,500	7,300	7,100	7,200	7,102	33,300	42,800	34,000	20,900	29,124	246,778	399,644	428,837	409,338	331,188
Sablefish	--	--	--	--	--	--	--	--	--	--	50,100	47,700	59,400	43,300	37,124	50,100	47,700	59,400	43,300	37,124
Mullets	--	--	111	93	279	14,100	13,900	14,900	15,100	15,690	--	--	--	--	--	14,100	13,900	15,011	15,193	15,969
Crabs	--1/	--1/	40,005	33,516	37,362	29,700	29,700	28,600	30,900	30,776	62,500	58,800	57,500	40,900	52,004	92,200	88,500	126,105	105,316	120,142
Lobster	--1/	15,498	11,393	10,511	11,330	4,600	3,900	5,400	5,100	5,739	100	100	200	100	91	4,700	19,498	16,993	15,711	17,160
Shrimp	--1/	13,542	11,016	9,706	8,615	113,400	116,500	115,000	93,600	95,767	42,100	48,900	49,300	65,400	63,262	155,500	178,942	175,316	168,706	167,644
Oyster	--1/	--1/	183,277	196,274	199,808	135,900	143,300	122,300	105,100	92,243	32,100	32,600	33,700	26,100	14,683	168,000	175,900	339,277	327,474	306,734
Scallops	55,772	54,031	56,822	55,912	76,197	10,900	11,600	10,600	10,800	5,579	5,100	3,300	4,100	3,500	1,780	71,772	68,931	71,522	70,212	83,556
Clams	--1/	--1/	170,712	248,856	289,719	5,800	1,800	2,000	2,500	2,397	1,400	1,400	2,500	3,200	3,496	7,200	3,200	175,212	254,556	295,612
Squid	--	22,210	48,510	56,771	55,878	--	--	--	--	47	11,200	14,300	9,300	4,900	10,822	11,200	36,510	57,810	61,671	66,747
Subtotal	1,053,342	1,371,747	1,857,989	1,646,291	1,743,145	964,100	1,149,000	962,800	844,200	973,306	2,783,500	2,377,000	2,816,100	2,081,600	2,424,334	4,800,942	4,897,747	5,636,889	4,572,091	5,140,785
Other 2/	591,048	553,783	118,671	474,727	60,954	62,400	63,300	66,200	56,500	63,845	213,100	203,400	241,900	196,900	227,681	866,548	820,483	426,771	728,127	352,480
TOTAL	1,644,390	1,925,530	1,976,660	2,121,018	1,804,099	1,026,500	1,212,300	1,029,000	900,700	1,037,151	2,996,600	2,580,400	3,058,000	2,278,500	2,652,015	5,667,490	5,718,230	6,063,660	5,300,218	5,493,265

1/ Catch classified as "other shellfish, etc." during 1970 and 1971.

2/ Refers to all species caught that were not included in the GAO list of fish species.

Note: Exclusive of Portugal, Republic of China (Taiwan) and Republic of Korea (South Korea)

Source: FAO

APPENDIX V

FISH CATCH BY BULGARIA OFF U.S. COASTLINE
(METRIC TONS)

Species	ATLANTIC-NORTH					ATLANTIC SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tuna	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Capelin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Herring	1,058	5,590	2,872	2,569	2,546	--	--	--	--	--	--	--	--	--	--	1,058	5,590	2,872	2,569	2,546
Span. Sardine	--	--	--	--	--	--	--	--	--	--	-------NO FISH CAUGHT IN THIS AREA--------					--	--	--	--	--
Calif. Sardine	--	--	--	--	--	--------NO FISH CAUGHT IN THIS AREA-------					--	--	--	--	--	--	--	--	--	--
Menhaden	--	--	6	--	90	--	--	--	--	--	--	--	--	--	--	--	--	6	--	90
N. Pacific Anchovy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Halibut	--	--	8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	--	--
Sole/Flounder	--	256	573	93	--	--	--	--	--	--	--	--	--	--	--	--	256	573	93	--
Cod	--	10	76	40	--	--	--	--	--	--	--	--	--	--	--	--	10	76	40	--
Hake	--	4,598	5,057	1,938	3,005	--	--	--	--	--	--	--	--	--	--	--	4,598	5,057	1,938	3,005
Haddock	--	3	--	1	--	--	--	--	--	--	--	--	--	--	--	--	3	--	1	--
Pollack	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Marine Catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groupers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snappers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grunts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Croakers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Atlantic Redfish	--	15	15	33	--	--	--	--	--	--	--	--	--	--	--	--	15	15	33	--
Pacific Rockfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mackerel	--	28,507	23,556	31,743	20,723	--	--	--	--	--	--	--	--	--	--	--	28,507	23,556	31,743	20,723
Sablefish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mullets	--	--	--	--	--	--------NO FISH CAUGHT IN THIS AREA-------					-------NO FISH CAUGHT IN THIS AREA--------					--	--	--	--	--
Crabs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lobster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shrimp	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oyster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scallops	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Squid	--	90	499	410	592	--	--	--	--	--	--	--	--	--	--	--	90	499	410	592
Subtotal	1,058	39,069	32,662	36,827	26,956	--	--	--	--	--	--	--	--	--	--	1,058	39,069	32,662	36,827	26,956
Other 1/	6,280	5,823	7,113	70,464	2,592	--	--	--	--	--	--	--	--	--	--	6,280	5,823	7,113	70,464	2,592
TOTAL	7,338	44,892	39,775	107,291	29,548	--	--	--	--	--	--	--	--	--	--	7,338	44,892	39,775	107,291	29,548

1/ Refers to all species caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY CANADA OFF U.S. COASTLINE
(METRIC TONS)

SPECIES	ATLANTIC-NORTH					ATLANTIC-SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tuna	1,160	1,114	165	102	103	--	--	--	--	--	2,500	2,400	4,500	7,300	6,071	3,660	3,514	4,665	7,402	6,174
Capelin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelts	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Herring	5,012	28,381	11,691	9,190	4,261	--	--	--	--	--	--	--	--	--	--	5,012	28,381	11,691	9,190	4,261
Spanish Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
California Sardine	--	--	--	--	--	--------NO FISH CAUGHT IN THIS AREA--------					--	--	--	--	--	--	--	--	--	--
Menhaden	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
North Pacific Anchovy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Halibut	67	38	39	38	29	--	--	--	--	--	--	--	--	--	--	67	38	39	38	29
Sole/Flounder	257	254	52	74	61	--	--	--	--	--	--	--	--	--	--	257	254	52	74	61
Cod	3,422	4,138	3,366	3,869	2,009	--	--	--	--	--	--	--	--	--	--	3,422	4,138	3,366	3,869	2,009
Hake	46	100	40	117	233	--	--	--	--	--	--	--	--	--	--	46	100	40	117	233
Haddock	2,016	1,715	632	1,612	660	--	--	--	--	--	--	--	--	--	--	2,016	1,715	632	1,612	660
Pollack	853	1,636	1,366	1,727	3,539	--	--	--	--	--	--	--	--	--	--	853	1,636	1,366	1,727	3,539
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Marine Catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groupers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snappers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grunts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Croakers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Atlantic Redfish	338	269	124	35	59	--	--	--	--	--	--	--	--	--	--	338	269	124	35	59
Pacific Rockfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mackerel	--	--	1	53	--	--	--	--	--	--	--	--	--	--	--	--	--	1	53	--
Sablefish	--	--	--	--	--	--------NO FISH CAUGHT IN THIS AREA--------					--	--	--	--	--	--	--	--	--	--
Mullets	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crabs	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--
Lobster	--	101	204	228	178	--	--	--	--	--	--	--	--	--	--	--	101	204	228	178
Shrimp	--	--	8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	--	--
Oyster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scallops	34,006	32,434	34,670	35,055	50,934	--	--	--	--	--	--	--	--	--	--	34,006	32,434	34,670	35,055	50,934
Clams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Squid	--	1	--	3	27	--	--	--	--	--	--	--	--	--	--	--	1	--	3	27
Subtotal	47,177	70,181	52,358	52,104	62,094	--	--	--	--	--	2,500	2,400	4,500	7,300	6,071	49,677	72,581	56,858	59,404	68,165
Other[1]	2,261	175	83	95	93	--	--	--	--	--	300	200	100	300	180	2,561	375	183	395	273
TOTAL	49,438	70,356	52,441	52,199	62,187	--	--	--	--	--	2,800	2,600	4,600	7,600	6,251	52,238	72,956	57,041	59,799	68,438

[1] Refers to all species caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY EAST GERMANY
OFF U.S. COASTLINE
(METRIC TONS)

	ATLANTIC NORTH					ATLANTIC SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
SPECIES	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tuna	--	--	--	51	42	--	--	--	--	--	--	--	--	--	--	--	--	--	51	42
Capelin	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--
Smelts	--	--	--	--	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6
Herring	37,008	29,083	52,793	60,240	35,197	--	--	--	--	--	--	--	--	--	--	37,008	29,083	52,793	60,240	35,197
Spanish Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calif. Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menhaden	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
North Pacific Anchovy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Halibut	--	--	--	--	--	----------NO FISH CAUGHT IN THIS AREA----------					--	--	--	--	--	--	--	--	--	--
Sole/ Flounder	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cod	--	--	138	75	67	--	--	--	--	--	--	--	--	--	--	--	--	138	75	67
Hake	--	97	265	194	38	--	--	--	--	--	--	--	--	4,800	1,246	--	97	265	4,994	1,284
Haddock	--	--	5	1	--	--	--	--	--	--	--	--	--	--	--	--	--	5	1	--
Pollack	--	6,849	4,802	948	2	--	--	--	--	--	--	--	--	--	--	--	6,849	4,802	948	2
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Marine Catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groupers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snappers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grunts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Croakers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Atlantic Redfish	--	1	127	40	123	--	--	--	--	--	--	--	--	--	--	--	1	127	40	123
Pacific Rockfish	--	--	--	--	--	--	--	--	--	--	--	--	--	500	--	--	--	--	500	--
Mackerel	4,999	69,973	80,539	76,758	59,977	--	--	--	--	--	--	--	--	--	--	4,999	69,973	80,539	76,758	59,977
Sablefish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mullets	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crabs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lobster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shrimp	--	--	--	--	--	----------NO FISH CAUGHT IN THIS AREA----------					--	--	--	--	--	--	--	--	--	--
Oyster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scallops	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Squid	--	--	--	313	--	--	--	--	--	--	--	--	--	--	--	--	--	--	313	--
Subtotal	42,007	106,003	138,669	138,622	95,452	--	--	--	--	--	--	--	--	5,300	1,246	42,007	106,003	138,669	143,922	96,698
Other[1]	11,379	882	1,106	12,231	31	--	--	--	--	--	--	--	--	--	--	11,379	882	1,106	12,231	31
Total	53,386	106,885	139,775	150,853	95,483	--	--	--	--	--	--	--	--	5,300	1,246	53,386	106,885	139,775	156,153	96,729

[1]Refers to all species caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY WEST GERMANY
OFF U.S. COASTLINE
(METRIC TONS)

SPECIES	ATLANTIC NORTH					ATLANTIC SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tuna	--	1	6	2	--	--	--	--	--	--	--	--	--	--	--	--	1	6	2	--
Capelin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Herring	88,577	56,467	30,746	32,685	26,153	--	--	--	--	--	--	--	--	--	--	88,577	56,467	30,746	32,685	26,153
Spanish Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calif. Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menhaden	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
North Pacific Anchovy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Halibut	--	--	--	--	--	----------NO FISH CAUGHT IN THIS AREA----------					----------NO FISH CAUGHT IN THIS AREA----------					--	--	--	--	--
Sole/ Flounder	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--
Cod	14	4	17	5	11	--	--	--	--	--	--	--	--	--	--	14	4	17	5	11
Hake	--	--	357	30	49	--	--	--	--	--	--	--	--	--	--	--	--	357	30	49
Haddock	--	4	--	1	--	--	--	--	--	--	--	--	--	--	--	--	4	--	1	--
Pollack	3,156	63	467	1,085	31	--	--	--	--	--	--	--	--	--	--	3,156	63	467	1,085	31
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Marine Catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groupers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snappers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grunts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Croakers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Atlantic Redfish	2	--	3	--	4	--	--	--	--	--	--	--	--	--	--	2	--	3	--	4
Pacific Rockfish	--	--	--	--	--	----------NO FISH CAUGHT IN THIS AREA----------					----------NO FISH CAUGHT IN THIS AREA----------					--	--	--	--	--
Mackerel	1,049	2,795	770	1,527	483	--	--	--	--	--	--	--	--	--	--	1,049	2,795	770	1,527	483
Sablefish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mullets	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crabs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lobster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shrimp	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oyster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scallops	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Squid	--	--	463	1,641	--	--	--	--	--	--	--	--	--	--	--	--	--	463	1,641	--
Subtotal	92,798	59,334	32,829	36,977	26,731	--	--	--	--	--	--	--	--	--	--	92,798	59,334	32,829	36,977	26,731
Other[1]	44	627	59	1,303	29	--	--	--	--	--	--	--	--	--	--	44	627	59	1,303	29
TOTAL	92,842	59,961	32,888	38,280	26,760	--	--	--	--	--	--	--	--	--	--	92,842	59,961	32,888	38,280	26,760

[1]Refers to all species caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY JAPAN
OFF U.S. COASTLINE
(METRIC TONS)

SPECIES	ATLANTIC NORTH					ATLANTIC SOUTH AND GULF					PACIFIC[1]					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tuna	--	--	--	--	--	1,700	1,200	200	300	289	65,800	54,600	66,200	65,300	52,199	67,500	55,800	66,400	65,600	52,488
Capelin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelts	369	5,398	97	90	--	--	--	--	--	--	--	--	--	--	--	369	5,398	97	90	--
Herring	1,421	2,466	1,161	1,722	2,442	--	--	--	--	--	24,900	25,000	13,300	19,000	5,305	26,321	27,466	14,461	20,722	7,747
Spanish Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calif. Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menhaden	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
North Pacific Anchovy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Halibut	18	--	--	--	--	--	--	--	--	--	1,600	2,100	1,300	400	2,209	1,618	2,100	1,300	400	2,209
Sole/ Flounder	164	44	18	65	73	--	--	--	--	--	105,000	120,000	148,600	163,800	120,089	105,164	120,044	148,618	163,865	120,162
Cod	16	20	100	3	--	--	--	--	--	--	58,000	27,000	29,200	25,000	35,691	58,016	27,020	29,300	25,003	35,691
Hake	489	423	1,081	463	107	--	--	--	--	--	--	1,600	400	2,800	960	489	2,023	1,481	3,263	1,067
Haddock	1	10	--	--	--	--	--	--	--	--	--	--	--	--	--	1	10	--	--	--
Pollack	1	5	4	14	--	--	--	--	--	--	--	--	--	--	--	1	5	4	14	--
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	1,073,300	884,700	1,039,600	625,600	793,908	1,073,300	884,700	1,039,600	625,600	793,908
Marine Catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groupers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snappers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grunts	--	--	--	65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Croakers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	--	--	--	65	11
Atlantic Redfish	19	4	15	30	1	--	--	--	--	--	--	--	--	--	--	19	4	15	30	1
Pacific Rockfish	--	--	--	--	--	--	--	--	--	--	55,100	64,800	73,200	81,900	57,208	55,100	64,800	73,200	81,900	57,208
Mackerel	1,500	1,025	1,104	446	70	--	--	--	--	6	--	100	--	--	33	1,500	1,125	1,104	446	109
Sablefish	--	--	--	--	--	--	--	--	--	--	40,600	40,300	50,700	38,300	31,324	40,600	40,300	50,700	38,300	31,324
Mullets	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crabs	--	--	--	--	--	--	--	--	--	--	4,800	1,600	1,600	400	--	4,800	1,600	1,600	400	--
Lobster	--	27	11	7	--	--	--	--	--	--	--	--	--	--	--	--	27	11	7	--
Shrimp	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oyster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scallops	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Squid	--	10,602	18,691	15,526	16,820	--	--	--	--	--	--	--	200	400	251	--	10,602	18,891	15,926	17,071
Subtotal	3,998	20,024	22,282	18,431	19,513	1,700	1,200	200	300	295	1,429,100	1,221,800	1,424,300	1,022,900	1,099,188	1,434,798	1,243,024	1,446,782	1,041,631	1,118,996
Other[2]	25,571	7,867	6,537	14,468	6,285	8,500	11,400	4,600	3,100	8,823	63,700	48,400	55,200	36,000	71,500	97,771	67,667	66,337	53,568	86,608
TOTAL	29,569	27,891	28,819	32,899	25,798	10,200	12,600	4,800	3,400	9,118	1,492,800	1,270,200	1,479,500	1,058,900	1,170,688	1,532,569	1,310,691	1,513,119	1,095,199	1,205,604

[1]Includes catch off Canadian coast, which could not be separately identified in source data.
[2]Refers to all species caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY POLAND
OFF U.S. COASTLINE
(METRIC TONS)

SPECIES	ATLANTIC NORTH					ATLANTIC SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tuna	--	2	7	74	3	--	--	--	--	--	--	--	--	--	--	--	2	7	74	3
Capelin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Herring	70,734	90,550	43,112	52,537	40,503	--	--	--	--	--	--	--	--	100	--	70,734	90,550	43,112	52,637	40,503
Spanish Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calif. Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menhaden	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
North Pacific Anchovy	--	--	--	--	--	----------NO FISH CAUGHT IN THIS AREA----------					--	--	--	--	94	--	--	--	--	94
Halibut	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
Sole/Flounder	8	2	2	--	--	--	--	--	--	--	--	--	--	--	--	8	2	2	--	--
Cod	784	101	271	430	566	--	--	--	--	--	--	--	--	--	93	784	101	271	430	659
Hake	15	148	--	501	140	--	--	--	--	--	--	--	--	1,900	44,354	15	148	--	2,401	44,494
Haddock	15	1	1	--	--	--	--	--	--	--	--	--	--	--	--	15	1	1	--	--
Pollack	--	1	8	20	4	--	--	--	--	--	--	--	--	--	--	--	1	8	20	4
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Marine Catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groupers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snappers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grunts	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Croakers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Atlantic Redfish	30	84	5	28	2	--	--	--	--	--	--	--	--	--	--	30	84	5	28	2
Pacific Rockfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	120	--	--	--	--	120
Mackerel	68,140	112,294	142,359	117,254	96,103	--	--	--	--	--	--	--	--	--	117	68,140	112,294	142,359	117,254	96,220
Sablefish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mullets	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crabs	--	--	--	--	--	----------NO FISH CAUGHT IN THIS AREA----------					--	--	--	--	--	--	--	--	--	--
Lobster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shrimp	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oyster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scallops	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Squid	--	--	5,248	9,199	7,109	--	--	--	--	--	--	--	--	--	--	--	--	5,248	9,199	7,109
Subtotal	139,727	203,183	191,013	180,043	144,430	--	--	--	--	--	--	--	--	2,000	44,778	139,727	203,183	191,013	182,043	189,208
Other[1]	7,394	16,684	15,661	10,520	8,460	--	--	--	--	--	23,500	34,500	52,100	48,900	46,173	30,894	51,184	67,761	59,420	54,633
TOTAL	147,121	219,867	206,674	190,563	152,890	--	--	--	--	--	23,500	34,500	52,100	50,900	90,951	170,621	254,367	258,774	241,463	243,841

[1] Refers to all fish caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY THE UNITED STATES
OFF U.S. COASTLINE
(METRIC TONS)

SPECIES	ATLANTIC NORTH					ATLANTIC SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	2,375	3,505	19	11	--	--	--	--	--	--	186,200	151,000	105,500	96,900	88,821	188,575	154,505	105,519	96,911	88,821
Tuna	2,423	2,534	1,722	1,426	1,030	--	100	--	--	--	175,500	154,300	173,500	155,500	174,084	177,923	156,934	175,222	156,926	175,114
Capelin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelts	65	61	32	42	31	--	--	--	--	--	900	1,000	1,100	1,000	1,000	965	1,061	1,132	1,042	1,031
Herring	63,356	49,560	43,882	38,308	45,174	3,400	6,000	10,700	5,200	3,036	10,200	6,600	8,900	19,000	22,156	76,956	62,160	63,482	62,508	70,366
Spanish Sardine	--	--	--	--	--	200	100	--	100	200	--	--	--	--	--	200	100	--	100	200
Calif. Sardine	--	--	--	--	--	--	--	--	--	--	200	100	200	100	6	200	100	200	100	6
Menhaden	223,426	240,751	329,767	60,864	257,288	610,400	774,900	548,600	525,500	648,722	--	--	--	--	--	833,826	1,015,651	878,367	586,364	906,010
N. Pac. Anchovy	--	--	--	--	--	--	--	--	--	--	87,500	40,800	68,000	104,000	114,947	87,500	40,800	68,000	104,000	114,947
Halibut	52	81	63	51	46	--	--	--	--	--	15,600	12,800	11,600	10,900	8,289	15,652	12,881	11,663	10,951	8,335
Sole/Flounder	57,879	49,830	50,284	48,924	40,901	2,500	2,100	2,700	3,300	5,031	20,800	19,700	24,000	21,700	21,700	81,179	71,630	76,984	73,924	67,632
Cod	23,263	24,341	21,098	23,492	27,232	--	--	--	--	--	1,300	2,800	4,800	4,300	4,078	24,563	27,141	25,898	27,792	31,310
Hake	28,412	22,706	13,775	27,203	20,514	--	--	--	--	--	4,100	4,800	1,900	1,100	713	32,512	27,506	15,675	28,303	21,227
Haddock	9,872	8,500	4,779	3,289	3,018	--	--	--	--	--	--	--	--	--	--	9,872	8,500	4,779	3,289	3,018
Pollack	3,592	4,732	5,243	5,731	8,050	--	--	--	--	--	--	--	--	--	--	3,592	4,732	5,243	5,731	8,050
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	200	100	100	--	47	200	100	100	--	47
Marine Catfish	--	--	--	--	--	200	100	300	100	92	--	--	--	--	--	200	100	300	100	92
Groupers	6,135	4,603	4,605	5,975	4,772	3,900	3,700	3,700	3,400	3,585	--	--	--	--	--	10,035	8,303	8,305	9,375	8,357
Snappers	--	--	--	--	--	5,100	6,100	5,200	5,000	4,777	100	100	--	200	135	5,200	6,200	5,200	5,200	4,912
Grunts	--	--	--	--	--	300	300	200	300	300	--	--	--	--	--	300	300	300	300	300
Croakers	3,092	788	6,100	7,505	7,198	13,500	16,200	21,700	22,600	28,034	300	200	200	200	233	16,892	17,188	28,000	30,305	35,465
Atl. Redfish	15,534	16,267	13,158	11,954	8,677	--	--	--	--	--	--	--	--	--	--	15,534	16,267	13,158	11,954	8,677
Pac. Rockfish	--	--	--	--	--	--	--	--	--	--	19,400	16,500	19,200	18,400	14,581	19,400	16,500	19,200	18,400	14,581
Mackerel	4,049	2,406	2,017	1,410	1,079	8,500	7,300	7,100	7,200	7,096	22,000	27,300	23,200	8,000	10,074	34,549	37,006	32,317	16,610	18,249
Sablefish	--	--	--	--	--	--	--	--	--	--	2,900	2,700	5,500	4,600	5,500	2,900	2,700	5,500	4,600	5,500
Mullets	--	--	111	93	279	14,100	13,900	14,900	15,100	15,690	--	--	--	--	--	14,100	13,900	15,011	15,193	15,969
Crabs	--	--	40,005	33,515	37,362	29,700	29,700	28,600	30,900	30,776	50,500	51,300	55,900	40,500	52,004	80,200	81,000	124,505	104,915	120,142
Lobster	--	15,370	11,170	10,276	11,152	4,600	3,900	5,400	5,100	5,739	100	100	200	100	91	4,700	19,370	16,770	15,476	16,982
Shrimp	--	13,542	11,008	9,706	8,615	113,400	116,500	115,000	93,600	95,767	42,100	48,900	49,300	65,400	63,262	155,500	178,942	175,308	168,706	167,644
Oyster	--	--	183,277	196,274	199,808	135,900	143,300	122,300	105,100	92,243	32,100	32,600	33,700	26,100	14,683	168,000	175,900	339,277	327,474	306,734
Scallops	21,766	21,597	22,152	20,857	25,263	10,900	11,600	10,600	10,800	5,579	5,100	3,300	4,100	3,500	1,780	37,766	36,497	36,852	35,157	32,622
Clams	--	--	170,712	248,856	289,719	5,800	1,800	2,000	2,500	2,397	1,400	1,400	2,500	3,200	3,496	7,200	3,200	175,212	254,556	295,612
Squid	--	1,182	1,197	1,635	2,422	--	--	--	--	47	11,200	14,300	9,100	4,500	10,571	11,200	15,482	10,297	6,135	13,040
Subtotal	465,291	482,356	936,176	757,397	999,630	962,400	1,137,600	899,000	835,800	949,111	689,700	592,700	602,500	589,200	612,251	2,117,391	2,212,656	2,437,676	2,182,397	2,560,992
Other 1/	520,013	483,328	19,413	303,181	17,068	53,900	50,900	51,400	50,400	53,322	20,000	22,500	37,200	48,700	47,128	593,913	556,728	108,013	402,281	117,518
TOTAL	985,304	965,684	955,589	1,060,578	1,016,698	1,016,300	1,188,500	950,400	886,200	1,002,433	709,700	615,200	639,700	637,900	659,379	2,711,304	2,769,384	2,545,689	2,584,678	2,678,510

1/Refers to all species caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY THE UNION OF SOVIET SOCIALIST REPUBLICS
OFF U.S. COASTLINE
(METRIC TONS)

SPECIES	ATLANTIC NORTH					ATLANTIC SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Salmon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tuna	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Capelin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelts	999	1,893	32,610	2,422	19,688	--	--	--	--	--	--	--	--	--	--	999	1,893	32,610	2,422	19,688
Herring	80,668	92,547	55,021	42,507	42,112	--	--	--	--	--	117,200	28,200	55,100	57,000	19,800	197,868	120,747	110,121	99,507	61,912
Spanish Sardine	--	--	--	--	--	--	8,800	9,700	200	100	--	--	--	--	--	--	8,800	9,700	200	100
Calif. Sardine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menhaden	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N. Pac. Anchovy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Halibut	--	--	--	--	--	--	--	--	--	--	15,800	13,000	20,600	1,000	11,100	15,800	13,000	20,600	1,000	11,100
Sole/Flounder	4,550	7,895	10,807	3,152	794	--	--	--	--	--	108,100	126,000	37,600	1,500	30,100	112,650	133,895	48,407	4,652	30,894
Cod	364	1,270	1,889	2,977	476	--	--	--	--	--	49,700	71,500	30,500	2,800	18,700	50,064	72,770	32,389	5,777	19,176
Hake	39,390	128,601	173,218	175,585	142,753	--	--	--	--	--	167,200	176,700	117,300	152,900	158,500	206,590	305,301	290,518	328,485	301,253
Haddock	103	374	141	602	111	--	--	--	--	--	--	--	--	--	--	103	374	141	602	111
Pollack	51	1,163	1,043	2,752	47	--	--	--	--	--	--	--	--	--	--	51	1,163	1,043	2,752	47
Alaska Pollock	--	--	--	--	--	--	--	--	--	--	24,500	59,000	391,100	64,200	362,000	24,500	59,000	391,100	64,200	362,000
Marine Catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groupers	--	--	--	--	--	--	--	400	--	--	--	--	--	--	--	--	--	400	--	--
Snappers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grunts	--	--	--	--	--	--	1,400	53,500	7,900	23,800	94,000	3,100	65,800	146,400	19,700	94,000	4,500	119,300	154,300	43,500
Croakers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Atlantic Redfish	--	3,394	5,641	5,263	1,745	--	--	--	--	--	--	--	--	--	--	--	3,394	5,641	5,263	1,745
Pacific Rockfish	--	--	--	--	--	--	--	--	--	--	60,600	56,600	52,800	15,800	21,700	60,600	56,600	52,800	15,800	21,700
Mackerel	124,483	127,828	134,057	145,796	109,141	--	--	--	--	--	11,300	15,400	10,800	12,900	18,900	135,783	143,228	144,857	158,696	128,041
Sablefish	--	--	--	--	--	--	--	--	--	--	6,600	4,700	3,200	400	300	6,600	4,700	3,200	400	300
Mullets	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crabs	--	--	--	--	--	--	--	--	--	--	7,200	5,900	--	--	--	7,200	5,900	--	--	--
Lobster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shrimp	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oyster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scallops	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Squid	--	6,138	6,976	8,977	8,495	--	--	--	--	--	--	--	--	--	--	--	6,138	6,976	8,977	8,495
Subtotal	250,608	371,103	421,403	390,033	325,362	--	10,200	63,600	8,100	23,900	662,200	560,100	784,800	454,900	660,800	912,808	941,403	1,269,803	853,033	1,010,062
Other 2/	17,901	35,611	67,590	61,447	26,058	--	1,000	10,200	800	1,700	105,600	97,800	97,300	63,000	62,700	123,501	134,411	175,090	125,247	90,458
TOTAL	268,509	406,714	488,993	451,480	351,420	--	11,200	73,800	8,900	25,600	767,800	657,900	882,100	517,900	723,500	1,036,309	1,075,814	1,444,893	978,280	1,100,520

1/ Includes catch off Canadian coast, which could not be separately identified in source data.

2/ Refers to all species caught that were not included in the GAO list of fish species.

APPENDIX V

FISH CATCHES BY OTHER COUNTRIES
OFF U.S. COASTLINE
(METRIC TONS)

	ATLANTIC NORTH					ATLANTIC SOUTH AND GULF					PACIFIC					TOTAL ALL REGIONS				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
CUBA																				
Sole/Flounder	--	--	118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	118	--	--
Cod	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--
Hake	--	265	828	--	--	--	--	--	--	--	--	--	--	--	--	--	265	828	--	--
Mackerel	--	145	9	--	--	--	--	--	--	--	--	--	--	--	--	--	145	9	--	--
Squid	--	--	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	--	--
Other	--	740	586	--	--	--	--	--	--	--	--	--	--	--	--	--	740	586	--	--
Total	--	1,150	1,557	--	--	--	--	--	--	--	--	--	--	--	--	--	1,150	1,557	--	--
FRANCE																				
Herring	--	--	500	2,784	3,765	--	--	--	--	--	--	--	--	--	--	--	--	500	2,784	3,765
Cod	--	--	--	--	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	45
Pollack	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9
Lobster	--	--	7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	--	--
Squid	--	--	296	820	--	--	--	--	--	--	--	--	--	--	--	--	--	296	820	--
Other	--	--	--	19	13	--	--	--	1,200	--	--	--	--	--	--	--	--	--	1,219	13
Total	--	--	803	3,623	3,832	--	--	--	1,200	--	--	--	--	--	--	--	--	803	4,823	3,832
ITALY																				
Mackerel	--	--	800	375	420	--	--	--	--	--	--	--	--	--	--	--	--	800	375	420
Squid	--	--	3,200	3,165	4,260	--	--	--	--	--	--	--	--	--	--	--	--	3,200	3,165	4,260
Other	--	--	--	375	--	--	--	--	1,000	--	--	--	--	--	--	--	--	--	1,375	--
Total	--	--	4,000	3,915	4,680	--	--	--	--	--	--	--	--	--	--	--	--	4,000	3,915	4,680
ROMANIA											---------NO FISH CAUGHT IN THIS AREA----------									
Herring	685	993	2,156	536	2,271	--	--	--	--	--	--	--	--	--	--	685	993	2,156	536	2,271
Halibut	107	22	--	--	--	--	--	--	--	--	--	--	--	--	--	107	22	--	--	--
Sole/Flounder	688	499	74	--	--	--	--	--	--	--	--	--	--	--	--	688	499	74	--	--
Cod	129	6	--	--	3	--	--	--	--	--	--	--	--	--	--	129	6	--	--	3
Hake	113	432	212	49	529	--	--	--	--	--	--	--	--	--	--	113	432	212	49	529
Haddock	--	225	14	--	--	--	--	--	--	--	--	--	--	--	--	--	225	14	--	--
Atlantic Redfish	35	--	14	--	--	--	--	--	--	--	--	--	--	--	--	35	--	14	--	--
Mackerel	758	4,521	2,519	5,876	6,966	--	--	--	--	--	--	--	--	--	--	758	4,521	2,519	5,876	6,966
Squid	--	--	66	150	9	--	--	--	--	--	--	--	--	--	--	--	--	66	150	9
Other	205	2,016	289	531	112	--	--	--	--	--	--	--	--	--	--	205	2,016	289	531	112
Total	2,720	8,714	5,344	7,142	9,890	--	--	--	--	--	--	--	--	--	--	2,720	8,714	5,344	7,142	9,890
SPAIN																				
Halibut	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Sole/Flounder	--	--	--	--	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36
Cod	7,249	7,619	6,704	5,980	6,374	--	--	--	--	--	--	--	--	--	--	7,249	7,619	6,704	5,980	6,374
Hake	63	--	19	5	57	--	--	--	--	--	--	--	--	--	--	63	--	19	5	57
Haddock	845	1,336	1,098	386	764	--	--	--	--	--	--	--	--	--	--	845	1,336	1,098	386	764
Pollack	6	184	80	799	664	--	--	--	--	--	--	--	--	--	--	6	184	80	799	664
Mackerel	--	50	6	--	--	--	--	--	--	--	--	--	--	--	--	--	50	6	--	--
Lobster	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--
Squid	--	4,197	11,860	14,932	16,144	--	--	--	--	--	--	--	--	--	--	--	4,197	11,860	14,932	16,144
Other	--	30	234	93	207	--	--	--	--	--	--	--	--	--	--	--	30	234	93	207
Total	8,163	13,416	20,002	22,195	24,247	--	--	--	--	--	--	--	--	--	--	8,163	13,416	20,002	22,195	24,247
UNITED KINGDOM																				
Sole/Flounder	--	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Cod	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
Haddock	--	--	--	--	568	--	--	--	--	--	--	--	--	--	--	--	--	--	--	568
Pollack	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	47
Other	--	--	--	--	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6
Total	--	--	--	--	666	--	--	--	--	--	--	--	--	--	--	--	--	--	--	666
TOTAL	10,883	23,280	31,706	36,875	43,315	--	--	--	2,200	--	--	--	--	--	--	10,883	23,280	31,706	39,075	43,315

Note: The other category refers to all species caught that were not included in the GAO list of fish species.

APPENDIX VI

THE EFFECT OF EXTENDED FISHERY JURISDICTION BY THE UNITED STATES ON INTERNATIONAL FISHERIES CONVENTIONS AND AGREEMENTS

by

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GAO note: The statements and conclusions contained herein do not necessarily represent the views of GAO.

*Much of the background material was gathered and prepared by Mary F. Fountain who also, along with Professors William Burke and Edward Miles, reviewed an early draft of the report. The views and conclusions are solely those of the author.

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SUMMARY

1. The United States, with the fourth longest coastline and the third largest continental shelf of any nation in the world, has unilaterally claimed exclusive jurisdiction over fisheries to a distance of 200 miles from its coastline. The legislation, Public Law 94-265, was signed into law on April 13 and will become fully effective March 1, 1977.

2. At the present time there are about 400 fishing vessels from some twenty foreign nations fishing within 200 miles of the United States catching about 3 million tons of fish annually.

3. Major stocks of fish important to the U.S. fishing industry have been overfished by foreign fishermen although by no means have foreign fishermen been the sole cause of overfishing of stocks of fish of economic importance to the United States. United States fishermen have also contributed to the decline in catch of certain important species.

4. In addition to directly reducing the supply of fishery resources off the coast of the United States foreign fishermen have damaged fixed fishing gear and have interfered with fishing operations of United States fishermen.

5. While world production of fish has increased at a rate of about 5 percent per year, increasing in absolute quantity in recent years to about 70 million metric tons, United States domestic production has remained relatively unchanged at about 2 million metric tons annually during the same period. Thus, during the period when the total consumption of edible fish doubled in the United States, the domestic fishing industry failed to capture any significant part of the increased market.

6. The United States is a member of 8 international fisheries and marine mammal conventions designed to provide for the conservation of living resources and for the orderly operation of fishing vessels of various nations fishing common stocks of fish on common fishing grounds. In addition the United States is a party to 10 executive agreements which provide a basis for dealing with particular problems of a bilateral nature.

7. The conventions and executive agreement were quite successful during the years of their implementation, but in recent years the number of foreign nations and the number of foreign flag vessels have increased to the extent that the effectiveness of the conventions and agreements has become increasingly less effective in conserving the resources and protecting the rights of United States fishermen.

8. Public Law 94-265, in an attempt to correct this imbalance, requires renegotiation by May 1, 1977, of the fisheries treaties and executive agreements in order to bring them into conformance with the

new law. This appears to be an almost impossible task, since it is unlikely that many foreign nations fishing off the United States coast will agree with the United States unilateral extension of exclusive jurisdiction to 200 miles or accede to its demands for the acceptance of United States sovereignty over fishery resources within the zone.

9. In the Northeastern Pacific Ocean, it is likely that the United States and Canada can reach agreement quite easily on reciprocal fishing rights within the 200-mile zones of each country although a different division of the catch between the fishermen of the two nations, in favor of United States fishermen, will probably result.

10. Problems with other nations, such as Japan and the Soviet Union which have major and traditional fisheries off the coast of the United States, will be complicated by the existence of the Japanese high seas salmon fishery and because of the apparent depletion of such major species as Alaskan black cod and Pacific hake. It can be anticipated that prolonged negotiation will be necessary to resolve the jurisdictional, conservation, and allocation problems between these nations and the United States. Additional problems can be anticipated because of the growing fisheries of South Korea, Taiwan and Poland in the Northeastern Pacific Ocean.

11. On the Atlantic coast, the major international fisheries treaties and executive agreements involved the large and mixed stocks of fish occurring off the coast of the United States from Cape Hatteras in the south to the Canadian border on the north. About 15 separate species of fish are fished extensively and in common by fishermen of the United States and about 15 foreign nations. During the past decade there has been a decline of about 33 percent in the biomass of fish in the area with severe economic consequences to the fisheries of the United States.

12. Recent action by the Northwest Atlantic Fisheries Commission has partially ameliorated the problem. Nevertheless, strong concern on the part of fishermen and the general public along the Atlantic coast remains, and it is likely that any new agreements with foreign nations regarding their continued fishing without mutual acceptance of United States sovereignty over fisheries out to a limit of 200 miles will be severely criticized by these groups. One can anticipate prolonged negotiations and great difficulty in reaching agreements, especially in view of the Public Law 94-265. The new Conservation and Management Act of 1976 requires acceptance by foreign governments of United States absolute sovereignty over the fisheries resources; this will be a bitter pill to swallow.

13. In the Gulf of Mexico the situation is somewhat reversed. About 400 United States shrimp fishermen fish off the coast of Mexico and other Caribbean nations for shrimp and about 40 fishermen fish finfish. Mexico has extended its jurisdiction over fisheries to 200 miles and it appears certain that many other Caribbean and northeast coast South American countries who have not yet extended their jurisdiction will follow suit very soon. The United States government in

this case will be required to attempt to negotiate for continued United States shrimp and red snapper fishing off the coast of these countries. Public Law 94-265 provides for the prohibition of the imports of fisheries products from nations who refuse to conclude an agreeement permitting United States fishing vessels continued access to fishery resources if such United States vessels have traditionally fished in waters off the coast of foreign nations. It seems likely that these important prohibitions provided for in Section 285 in Public Law 94-265 will increase the difficulty in resolving problems for United States fishermen in such areas.

14. The United States is a member of two multinational fishery commissions dealing with highly migratory species of fish such as tuna: the Inter-American Tropical Tuna Commission and the International Convention for the Conservation of Atlantic Tunas. Because the majority of the efficient United States tuna fleet fishes almost entirely off the coast of foreign nations, it will undoubtedly be necessary to renegotiate the provisions of these two Conventions. Coastal nations involved will demand greater coastal state jurisdiction over tuna fishing vessels fishing within their 200-mile limit. On the other hand, United States law provides for international agreements regulating the conservation and management of these highly migratory species. One can predict again a prolonged period of negotiation and confrontation with coastal states off whose coasts our fleets fish tuna.

15. Two important marine conventions will be affected by the extension of jurisdiction to 200 miles.

a. The International Whaling Convention (IWC) permits limited whaling in almost all oceans. Whaling nations such as Japan and the Soviet Union will be affected by extension of jurisdiction since they take significant numbers of whales within the 200-mile limit of many coastal nations including the offshore waters of the United States; thus, modifications to the Convention will be necessary. In spite of these problems for the whaling nation, it appears that the IWC should continue in a modified form and will not require major modification in its mandate.

b. The North Pacific Fur Seal Convention has been an effective means of conserving and allocating the harvest of Pacific fur seals. It may require some modification to take into account the coastal migrations of fur seals within the 200-mile limit of Asia and North America. However, it would appear most likely that this convention will continue with relatively little change in substance with respect to its charter.

16. The 10 executive agreements between the United States and foreign fishing countries will for the most part not be continued much beyond March 1, 1977. These were negotiated to resolve specific problems and conflicts of a relatively transitory nature. During the transition

period until there is general acceptance of the United States 200-mile fish jurisdiction, there may be the need for the continuation of certain of these agreements. The shrimp agreement between the United States and Brazil is one of the executive agreements that should be continued. It is desirable where possible to incorporate the appropriate provisions of the current bilaterals into new agreements with foreign nations.

17. As pointed out by the President in signing Public Law 94-265, its provisions deviate significantly from the draft text of the Law of the Sea Convention (LOS). The enforcement articles of the LOS draft text provide for significantly different and considerably less stringent provisions in our domestic law. Still other sections of our domestic law, for example those dealing with import prohibitions (Section 205), are contrary to both national policy in other areas of concern to the United States and to certain international commitments of the United States especially those provided for in GATT (General Agreement for Trade and Tariff).

18. In spite of the difficulties that lie ahead in implementing the extension of fishing jurisdiction of the U.S. to 200 miles, the inevitable conclusion is that this action is timely and necessary to provide the opportunity for improved conservation of fishery resources lying off the coast of the United States and an improved opportunity for United States fishermen to increase their share of the catch of fishery resources in these rich waters.

APPENDIX VI

THE EFFECT OF EXTENDED FISHERY JURISDICTION BY THE UNITED STATES ON INTERNATIONAL FISHERIES CONVENTIONS AND AGREEMENTS

INTRODUCTION

On Monday, April 13, 1976, the President signed into law the Fishery Conservation and Management Act of 1976 (Public Law PL 94-265). In the statement made by the President at the time of signing, he stated his concern with regard to our ability to fulfill the tasks called for by the legislation in the time and manner provided for in the Act. He indicated that he was anxious that no action be taken which would compromise our commitment to protect both the rights of navigation as well as the welfare of distant water fisheries, and further that no one in this country wanted to see the United States engaged in unnecessary national disputes simply because of a lack of flexibility in applying the provisions of the legislation.

Four issues were specifically raised in the President's statement. First, in the absence of timely action, the bill might cause serious impediments for the United States in meeting its obligations under existing treaties and bilateral agreements. Second, the bill contemplates unilateral enforcement by the United States over foreign fishing for salmon and other anadromous species of fish seaward of the 200-mile zone. Enforcement of such a provision in the absence of bilateral or multilateral agreements would be contrary to accepted international law. Third, the enforcement provisions of PL 94-265 dealing with the seizure of unauthorized fishing vessels, lack adequate assurances of reciprocity in keeping with the tenets of international law; and fourth, the measure purports to encroach upon the exclusive province of the executive with respect to international negotiations. The President went on to say that he was hopeful that these issues could be resolved by responsible administrative action and, where necessary, curative legislation.

Congress, obviously anticipating passage of this bill and/or the signature and ultimate ratification of the multilateral multi-national Law of the Sea convention, has asked the General Accounting Office to examine the international implications of the 200-mile fishery zone soon to be implemented by the Fishery Conservation and Management Act of 1976 (PL 94-265).

In this paper we will attempt to: (a) assess the effects of extended fishery jurisdiction by the United States on international fisheries commissions and conventions and on bilateral executive fishery agreements; (b) look at the expected impact of the 200-mile zone on foreign fishing; and (c) make an assessment of the status and effectiveness of present United States conventions and bilateral agreements. We will comment on expected changes in these commissions and conventions as extended jurisdiction is implemented by the United States. The report will also comment on international fisheries agreements now in effect in other parts of the world with appropriate comments on the operative sections

of these conventions. The study is not intended to be a final, definitive analysis of the international implications of the 200-mile fishery zone. Rather, its purpose is to add to information which will provide an insight into the complexities of the problem of arriving at accommodations between coastal nations and foreign nations fishing in coastal waters. Our examination of this potentially difficult development emphasizes the problems inherent in the United States' unilateral extension of jurisdiction over fisheries to 200 miles off our coast. The report will discuss the issues by geographic areas approximately equivalent to those covered by the regional councils established under the 1976 Fishery Conservation and Management Act.

THE PROBLEM

The United States has great potential as a fish producing nation. It has the fourth longest coastline of any nation in the world (13,112 nautical miles). In addition, it has a continental shelf area of 860,600 square nautical miles (the third largest in the world). The waters lying off the North Atlantic coast, the Gulf of Mexico, and the Pacific coast of the United States and Alaska (including the Bering Sea), are among the richest and most productive regions of the world oceans. However, the United States produces only approximately 2 million metric tons of fish per year from the waters off its coast and the catch has varied but little over the past thirty years. The question of why this is so is a continuing problem.

Before 1950, there were virtually no foreign vessels fishing off the coast of the United States except a handful of Canadian boats fishing salmon, black cod and halibut off the coasts of Washington and Alaska and an occasional Canadian groundfish and scallop vessel off the coast of New England. Since that time foreign fishing off the coast of the United States has increased a hundred-fold, and the number of foreign flag fishing fleets has increased to over twenty.[1] The world fish catch during this period (1950-1975) has increased to about seventy millions of tons by 1975, increasing since the end of World War II at a rate slightly above 5 percent per year (Fig. 1, Table 1). The world catch dropped in the early 1970's, due primarily to a decline in the Peruvian anchovy fishery coupled with a failure of world herring fisheries elsewhere, both in the northwestern Pacific and northeastern Atlantic.

[1]During the past decade vessels from the following nations have been observed by the United States Coast Guard and National Marine Fisheries Service fishing within 200 miles off the United States coast: Bulgaria, Canada, Cuba, Denmark, Federal Republic of Germany, France, German Democratic Republic, Iceland, Ireland, Italy, Japan, Mexico, Norway, Poland, Republic of China (Taiwan), Republic of Korea, Romania, Spain, United Kingdom, U.S.S.R., and Venezuela.

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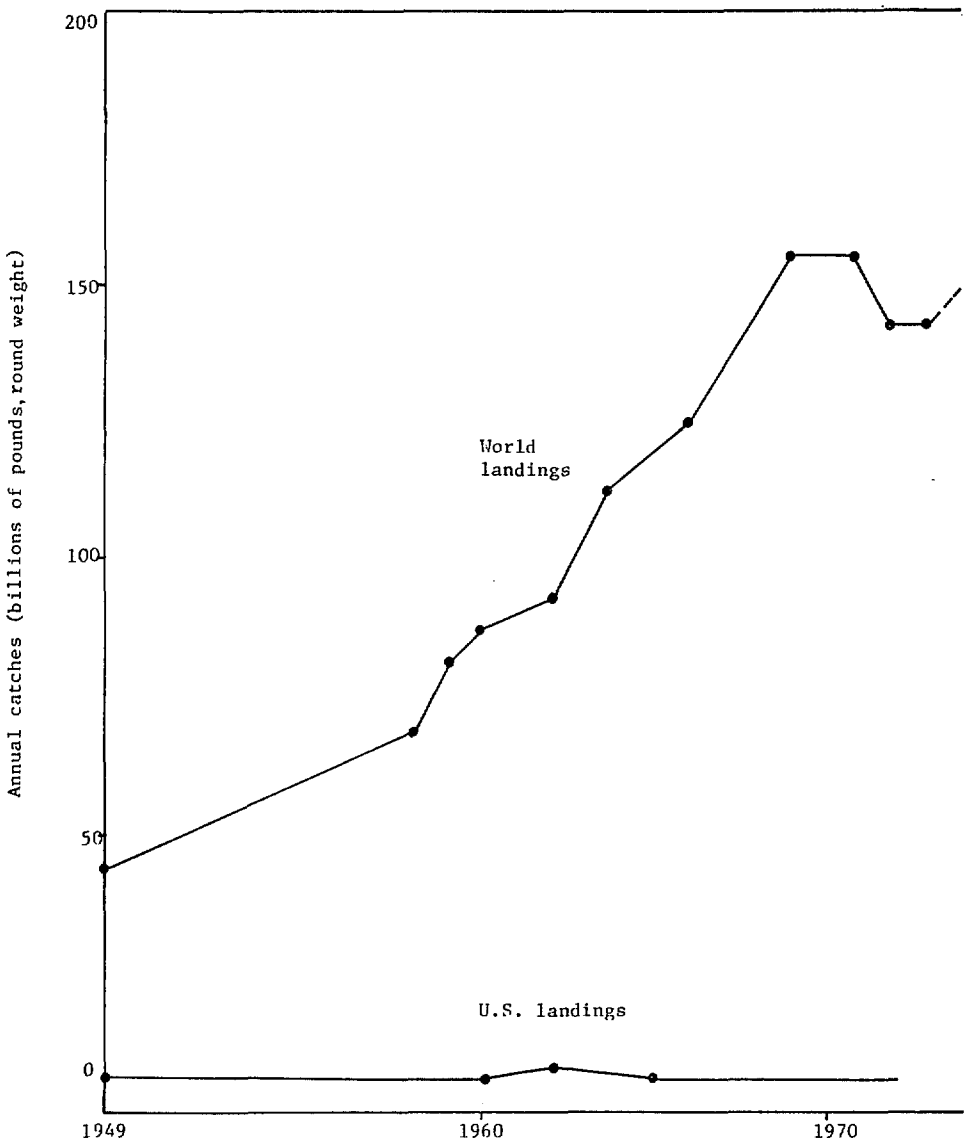
Figure 1. Historic World and U.S. landings of fish and shellfish.



From: National Marine Fisheries Service, NOAA, Department of Commerce. National Plan for Marine Fisheries, "Final Draft." Washington, D.C.: Dept. of Commerce. October 1976, p. 8.

But in the last two years (1974 and 1975), the Peruvian anchovy populations have increased again and the world's fish catch is again on the upswing.[2]

During the entire post-World War II period, the United States catch has declined slightly from about 2.5 to about 2 million metric tons. In the face of a steadily increasing world catch, why did the United States catch remain at this low level, particularly in light of a rapidly increasing domestic demand (Fig. 2)?

Table 1

World Fish Production

Year	Catch in millions of metric tons (mmt)
1850	1.5 - 2.25
1900	4.50
1930	10.00
1938	18.44
1950	18.43
1960	34.00
1970	70.00
1973	66.00

In 1972, the annual catch by foreign fishermen off the Pacific coast States of California, Washington, Oregon and Alaska reached a level of over three mmt, with over 2-1/2 mmt coming from Alaska (Fig. 3). It has been estimated that the potential yield from the United States coastal and offshore waters is somewhere between 10 and 20 mmt.

On the other hand, the United States has an abundance of experienced fishermen. The United States commercial fishing industry consists of 130,000 fishermen; approximately 2,000 processors; over 1,000 wholesalers; and 2,000 importer-exporters plus frozen and canned food distributors; etc.[3] The problem is then, that in spite of the very large population of fish of various species located off the United States coast, the very high productivity of these waters, the large and sophisticated fish catching and processing industry, the United States fishing industry has failed to take advantage of its proximity to this large resource and its catch remains at a relatively low level.

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[2]Data from published statistical reports of FAO and personal communications concerning the data for 1974 and 1975.

[3]National Marine Fisheries Service. National Plan for Marine Fisheries. "Final Draft;" Washington, D.C.: U.S. Department of Commerce, October 1975.

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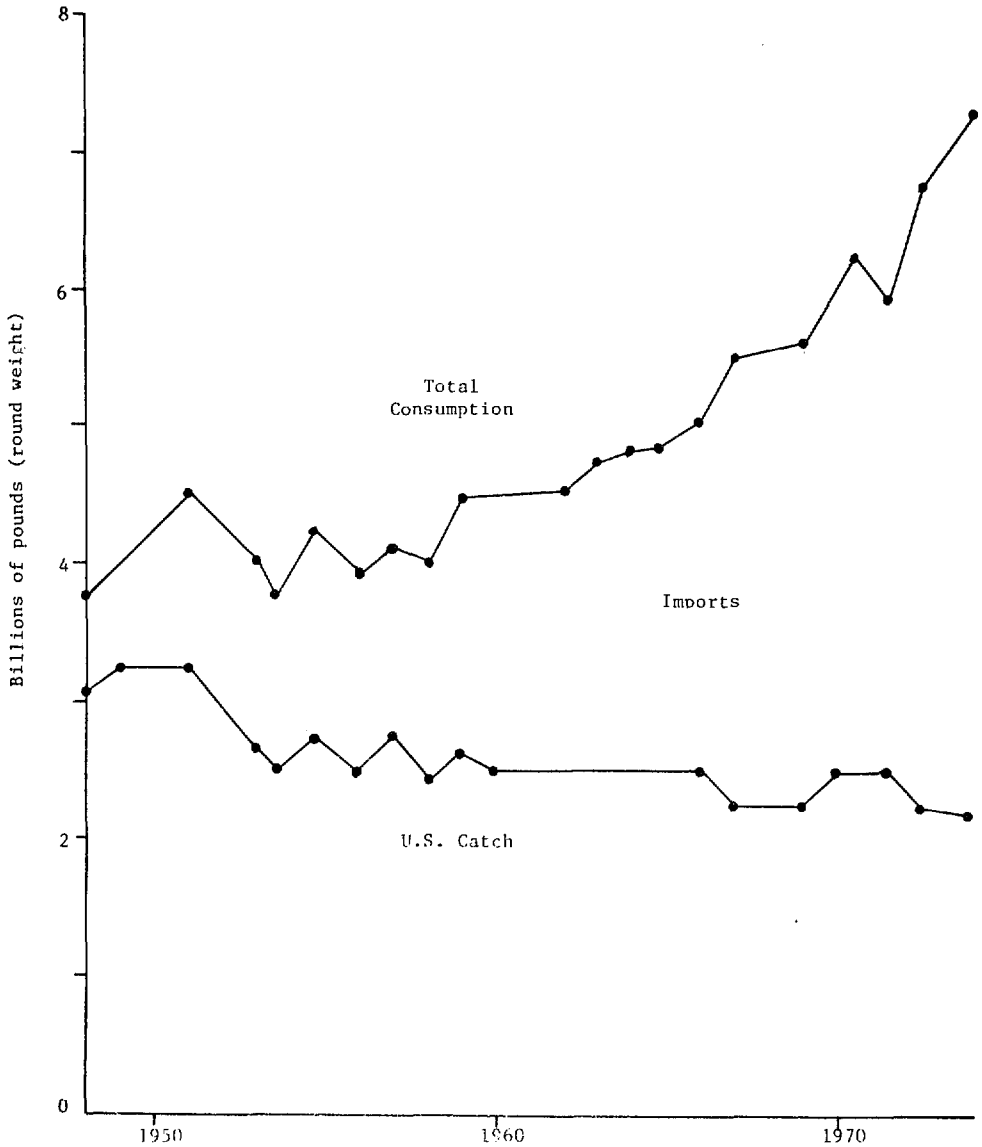
Figure 2. U.S. landings, imports, and consumption of edible fishery products.



From: National Marine Fisheries Service, NOAA, Department of Commerce. National Plan for Marine Fisheries, "Final Draft." Washington, D.C.: Department of Commerce, October 1975, p. 12.

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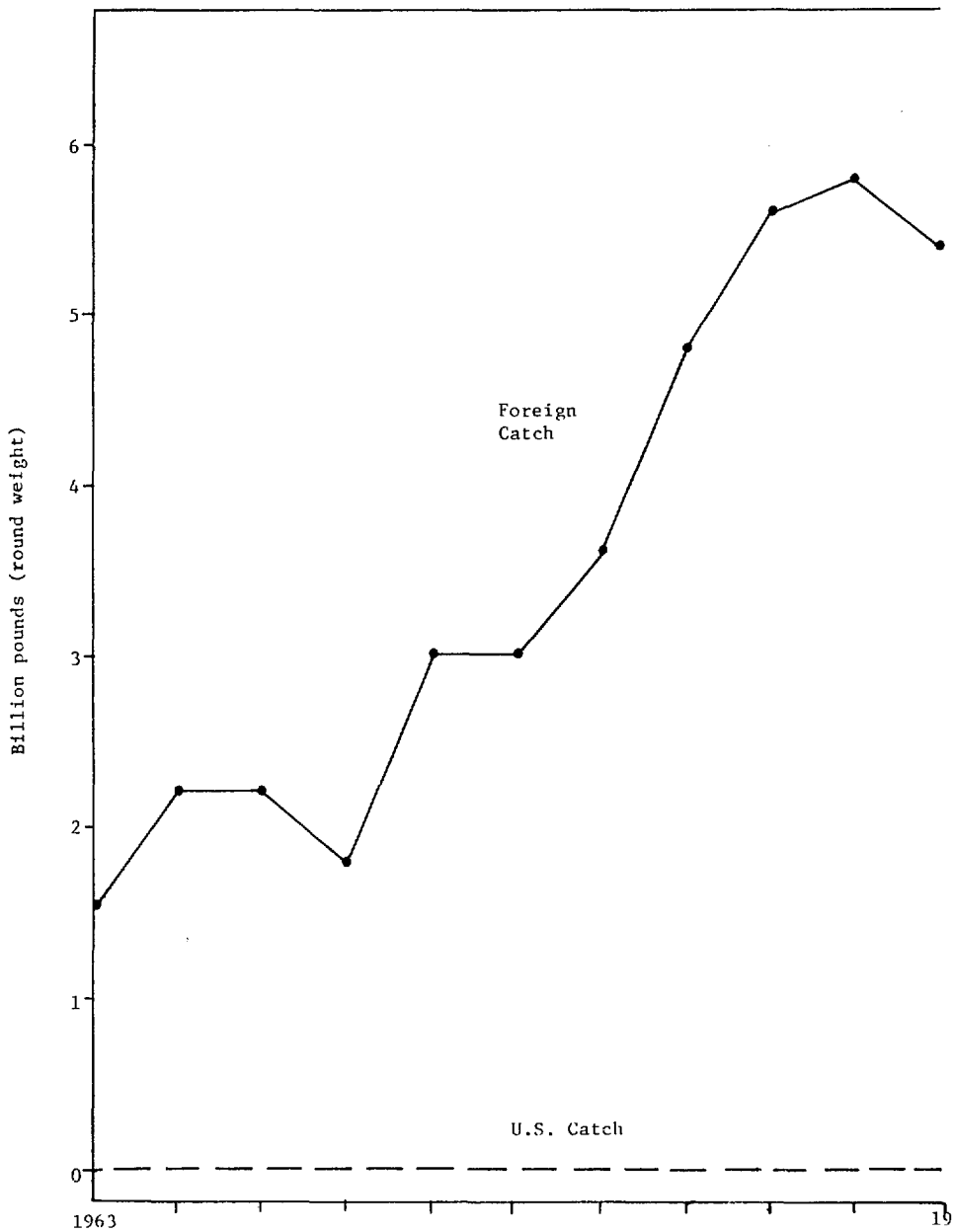
Figure 3. Estimated U.S. and foreign landings of Groundfish and Herring off Alaska, Washington, Oregon, and California.



From: National Marine Fisheries Service, NOAA, Department of Commerce. National Plan for Marine Fisheries "Final Draft;" Washington, D.C. Dept. of Commerce, Oct. 1975, p.6.

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7

THE EFFECTS OF FOREIGN FISHERIES

Overfishing

It has been assumed by many that the reason for the low catch by United States fishermen and the depletion[4] of fishery resources lying off the United States coast has been primarily caused by foreign fishermen. This is only partially correct. The primary cause of the decline of many fish stocks of importance to United States' fishermen has been a lack of a rational fishery management and control by the United States. It is true that foreign fishermen have contributed to overfishing[5] of some very important stocks of fish lying off the United States coast, (e.g., the haddock of Georges Bank and Pacific Ocean perch off the coast of the Pacific Northwest), but another serious cause of depletion has been overfishing by fishermen of the United States. The Draft National Fishery Plan[6] lists species of fish they consider to be depleted as of August, 1975. The following species were listed:[7]

Alaska pollock	Pacific salmon
abalone	Pacific sardine
Atlantic herring	pendalic shrimps
Atlantic menhaden	clams
Atlantic salmon	river herring
Atlantic sea scallops	rock fishes
flukes	sea run trout
haddock	striped bass
halibut	yellowfin sole
oysters	yellowtail flounder

To this list we would add the sturgeons, bay scallops and Olympia oysters.[8] Of these 23 depleted species, 15 have been fished exclusively, or almost exclusively, by fishermen of the United States and have been under almost exclusive United States control.

It is becoming quite clear, however, that Alaskan pollock has been overfished primarily by Japanese and Soviet fisheries in the Bering Sea. The catch by all foreign fishermen reached almost 2 mmt in 1972 and has

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[4]Depletion is defined as the reduction of the size of the stock below that which will, on the average, yield the maximum sustainable yield.

[5]Overfishing is used in the sense of fishing at a rate that will produce or maintain depletion.

[6]The Draft National Fishery Plan is an unpublished report widely circulated during the spring of 1976 by the National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce. It is in the process of publication.

[7]Ibid.

[8]Personal knowledge of the author and statistical reports of the NMFS.

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been declining since (Figure 4). For 1975, preliminary reports indicate that the catch probably did not even reach 1.5 mmt. The National Marine Fisheries Commission's Northwest Center scientists report substantial depletion of the stocks of Alaskan pollock and predict even lower catches for the future.

Other species have also been depleted by foreign fishing fleets. The incidental take of Pacific halibut, particularly by Japan, but also by the Soviet Union, has contributed substantially to the reduced productivity of Pacific halibut. The catch of Pacific halibut in the Northeastern Pacific Ocean and Bering Sea has declined by more than 50 percent in recent years (Figs. 5 and 6). The small Alaskan shrimp has been fished heavily by Japan and the Soviet Union in the Gulf of Alaska and particularly the Bering Sea. The particular stock fished by the Japanese and Soviets in the Bering Sea has been drastically reduced (Fig. 7). The Pacific ocean perch stocks located off the Oregon-Washington coast and in the Gulf of Alaska have also been seriously reduced by Japanese and Soviet vessels (Figs. 8-9). The same is true of the yellowfin sole, other flounders, and herring (Figs. 10-12) of the Bering Sea. These northern stocks of groundfish have been exclusively fished by foreign fishermen; there is no significant United States fishery on them.

On the Atlantic coast, Atlantic herring stocks have been overfished by the Soviet Union, Poland, and East and West Germany. Atlantic flounders, haddock, yellowtail flounder and river herring also have been depleted by foreign fishermen in the mid-Atlantic and New England fishing grounds. The Atlantic mackerel stock, while not showing a decline in catch until 1974 and 1975, is also showing indications of stock reduction due to foreign fishing. On the other hand, the Atlantic oyster, the Olympia oyster of the Pacific coast, the Atlantic and Pacific salmons, the Pacific sardine, and the Atlantic menhadden--species which are and have been under the sole control of the United States--have also suffered a reduction in productivity. The decline of these species has been brought about by poor United States management of its inshore environment and fisheries.

Effects of Foreign Fisheries Other than Overfishing

Foreign fisheries have had a number of adverse effects on United States fisheries other than overfishing and competing for the catch. In the case of Pacific ocean perch in the area off the coast of California, Oregon and Washington, the incidental fishing for these limited stocks, in contrast to directed fishing effort, by Soviet fishermen has kept the stock at a low level of abundance and deprived American fishermen of their traditional take of this species. In the Atlantic, the indiscriminate fishing for mixed stocks of herring, flounders and fluke, haddock, river herring, and yellowtail flounder by foreign fishermen has seriously reduced the total biomass and thus threatened the economic viability of coastal fisheries of the United States.[9] That is, even though the total

[9]Published and unpublished reports of the Northwest Atlantic Fisheries Commission (ICNAF) and United States section of that Commission.

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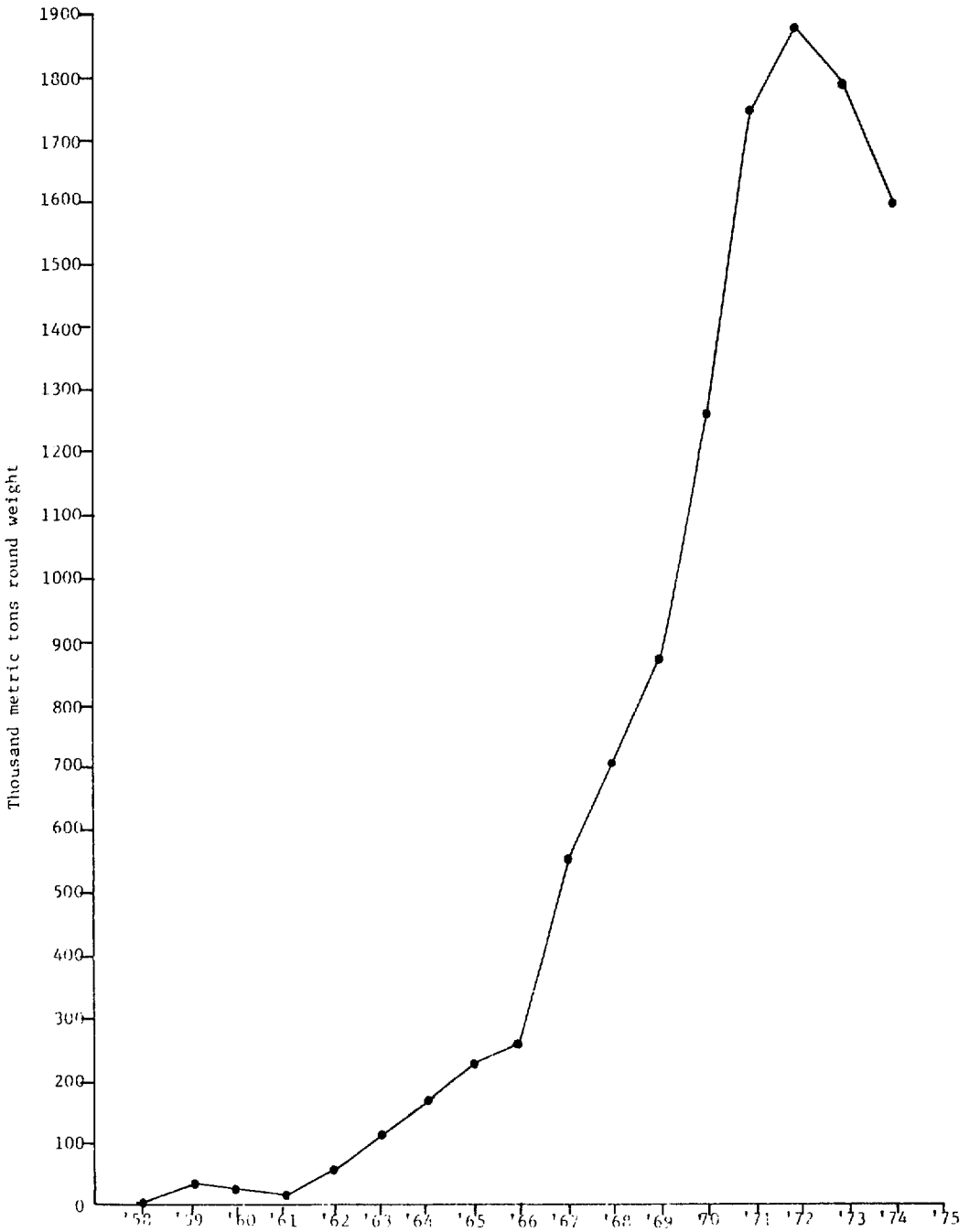
Figure 4. Total catch of Pollock in the Bering Sea and Aleutian Region combined in thousand metric tons round weight, 1958-74.



Source of statistics: Low, Loh Lee. Status of Major Demersal Fishery Resources of the Northeastern Pacific: Bering Sea and Aleutian Islands. "Northwest Fisheries Center Processed Report;" Seattle, WA: Northwest Fisheries Center (NMFS), April 1976, p. 75.

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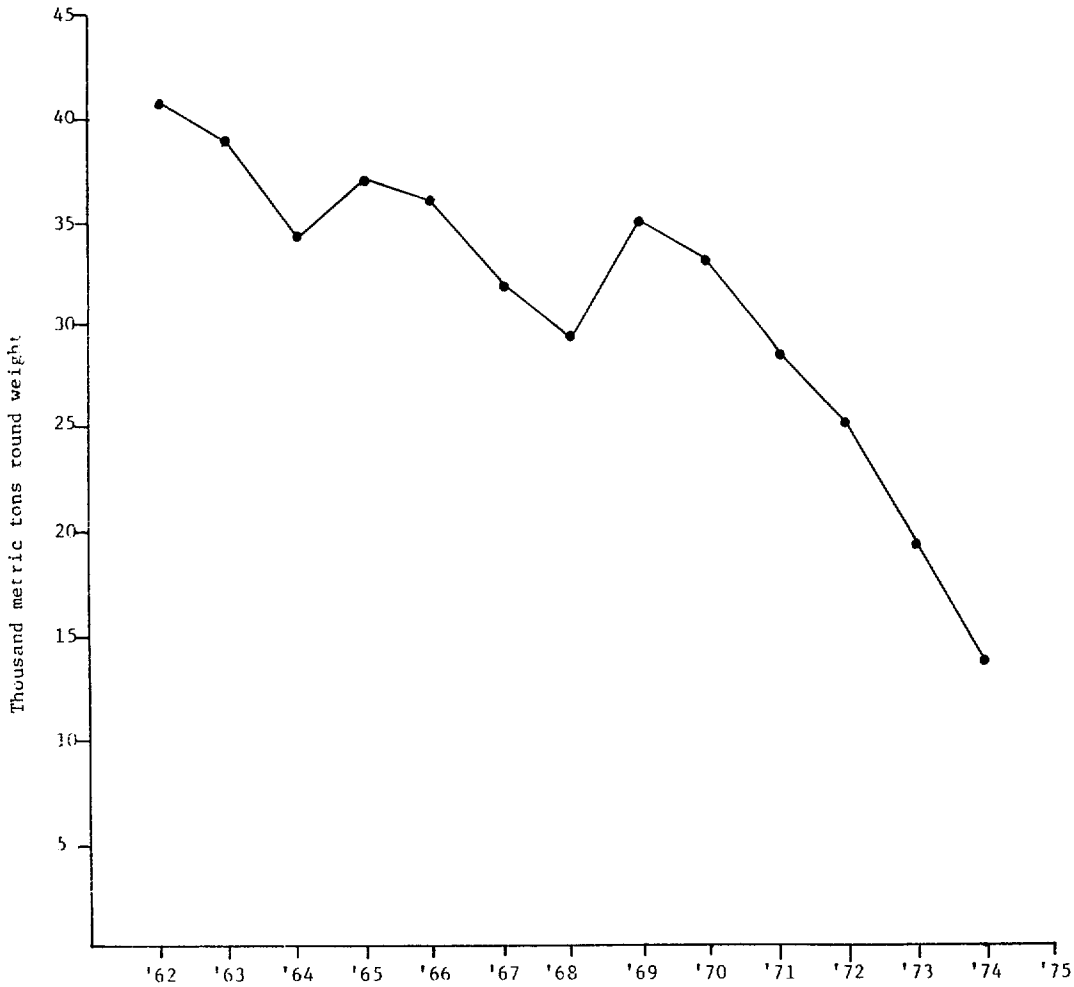
Figure 5. Total catch of Pacific Halibut in the Gulf of Alaska and off Pacific Northwest combined in thousand metric tons round weight, 1962-74.



Source of statistics: Low, Loh Lee. Status of Major Demersal Fishery Resources of the Northeastern Pacific: Bering Sea and Aleutian Islands. "Northwest Fisheries Center Processed Report;" Seattle, WA: Northwest Fisheries Center (NMFS), April 1976, p. 77.

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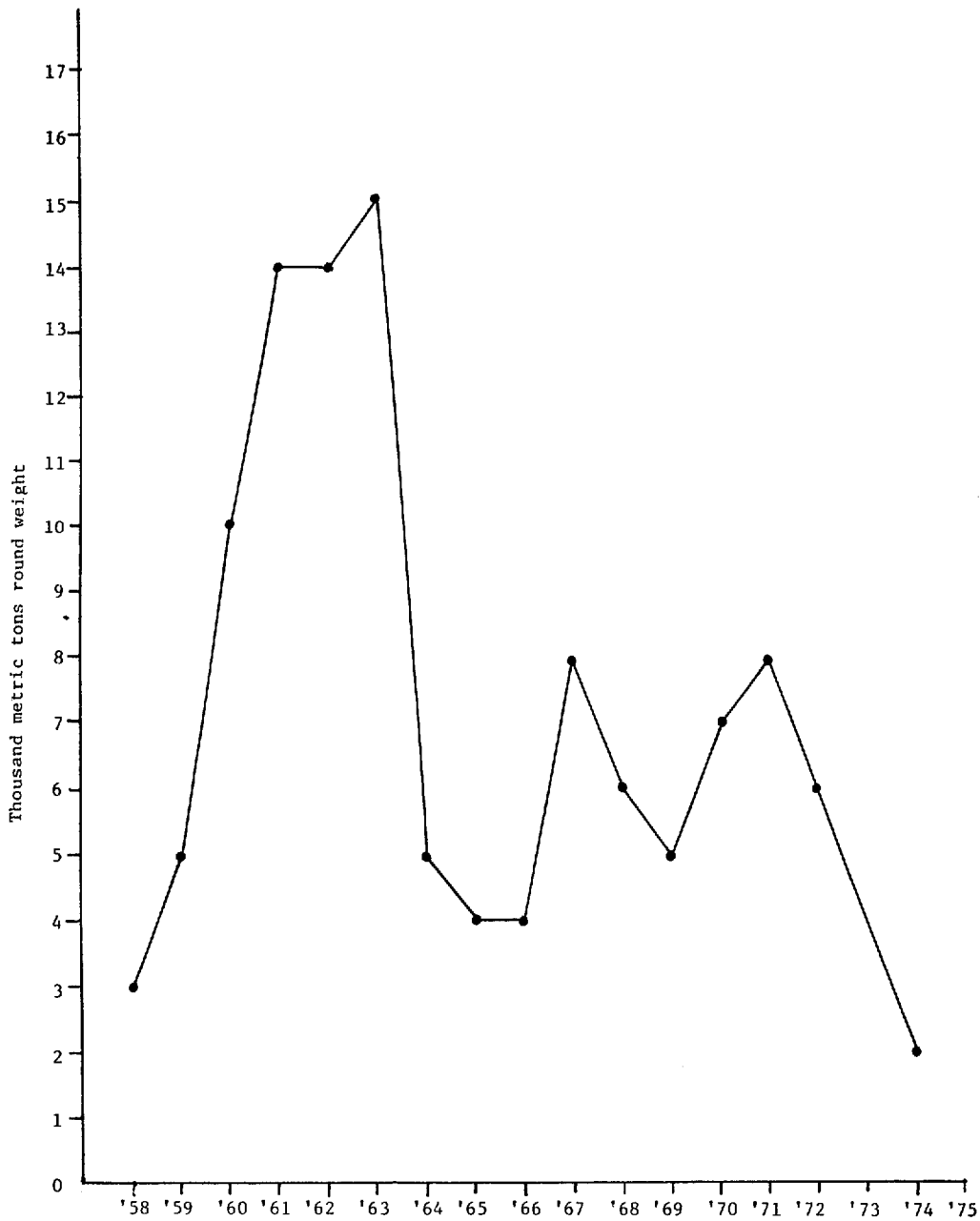
Figure 6. Total catch of Pacific Halibut in the Bering Sea and Aleutian Region combined in thousand metric tons round weight, 1958-74.



Source of Statistics: Low, Loh Lee. Status of Major Demersal Fishery Resources of the Northeastern Pacific: Bering Sea and Aleutian Islands. "Northwest Fisheries Center Processed Report," Seattle, WA: Northwest Fisheries Center (NWFS) April 1976, p.75.

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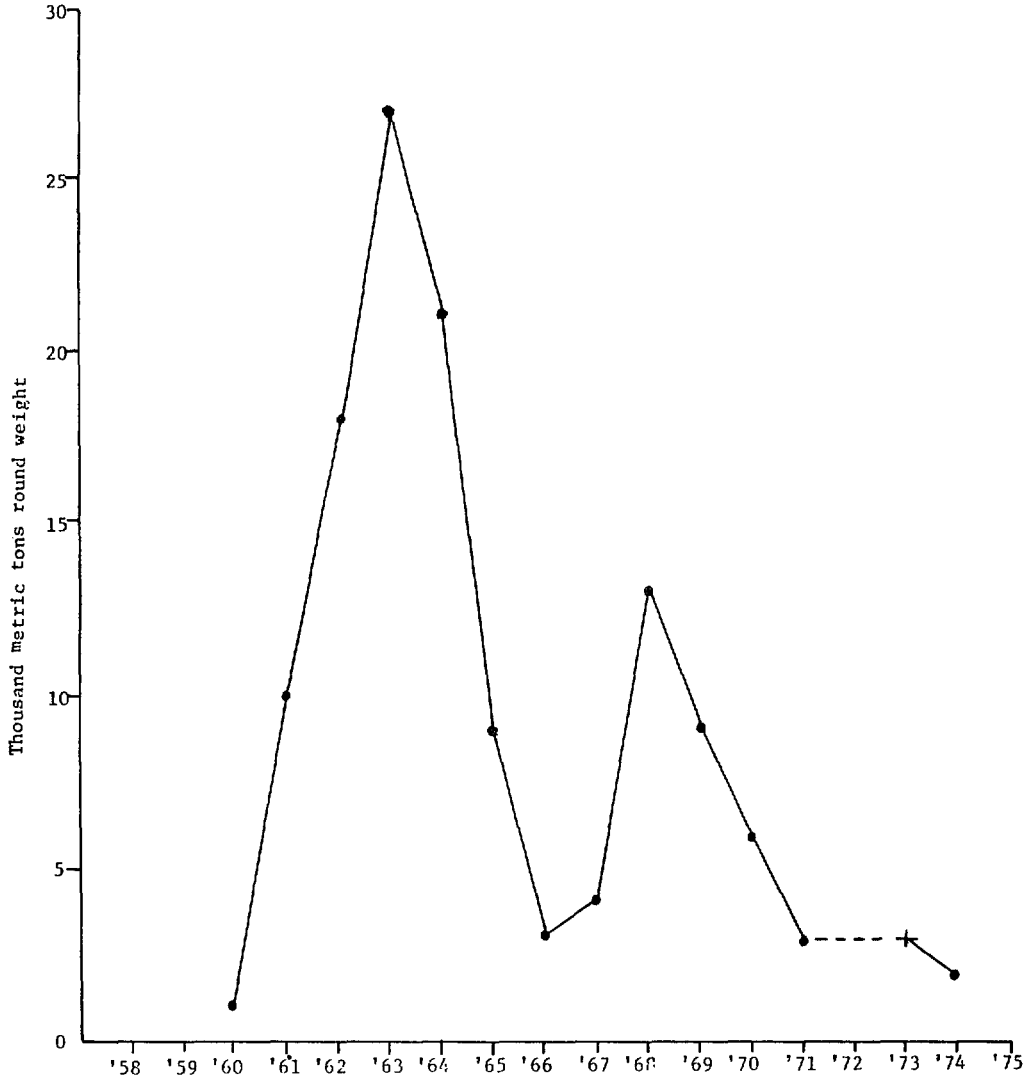
Figure 7. Total Catch of Shrimp in the Bering Sea and Aleutian Region combined in thousand metric tons pound weight, 1958-74.



--No data
+ Small catch
Source of statistics: Low, Loh Lee. Status of Major Demersal Fishery Resources of the Northeastern Pacific: Bering Sea and Aleutian Islands. "Northwest Fisheries Center Processed Report;" Seattle, WA: Northwest Fisheries Center (NWFS), April 1976, p.75.

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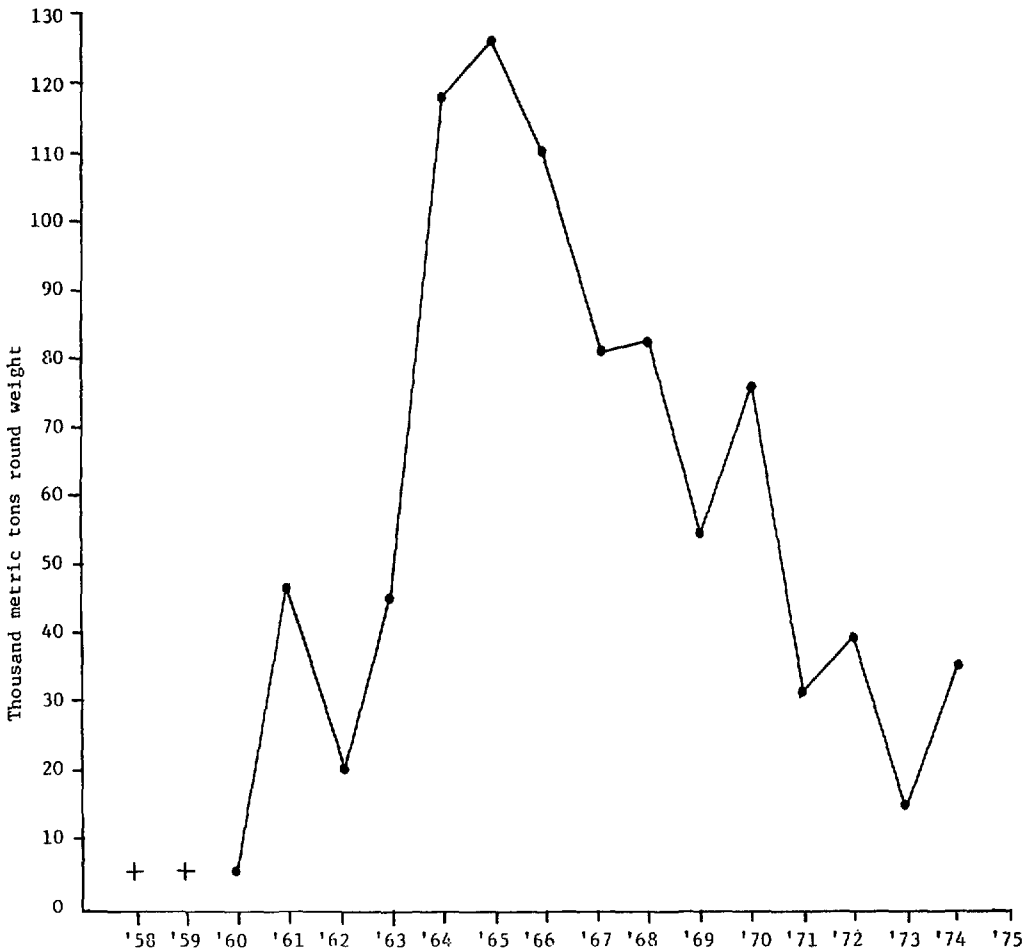
Figure 8. Total Catch of Pacific Ocean Perch in the Bering Sea and Aleutian Region combined in thousand metric tons round weight, 1958-74.



+ 1958 and 1957, small catches

Source of statistics: Low, Loh Lee. Status of Major Demersal Fishery Resources of the Northeastern Pacific: Bering Sea and Aleutian Islands. "Northwest Fisheries Center Processed Report;" Seattle, WA: Northwest Fisheries Center (NMFS), April 1976, p. 75.

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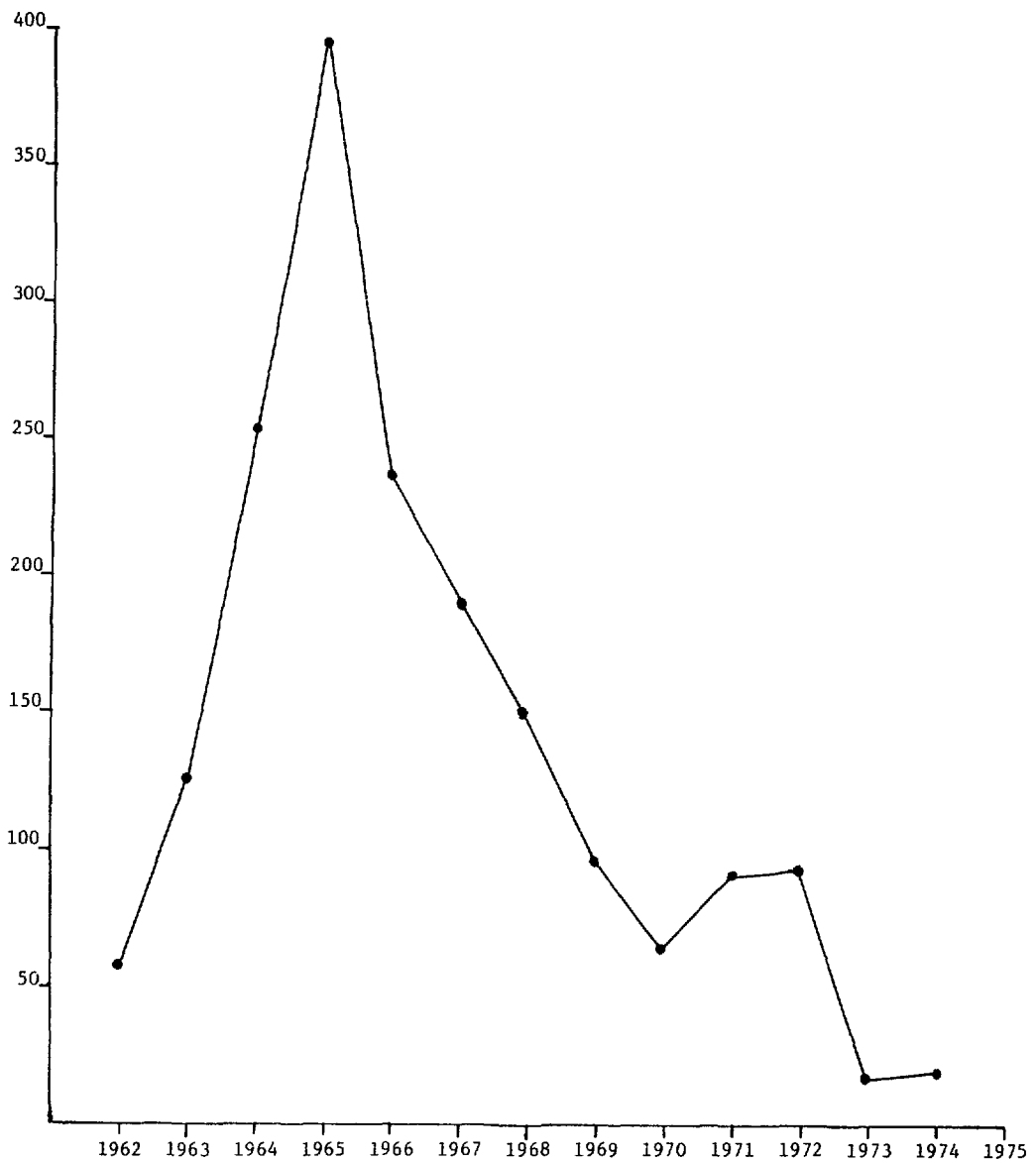
Figure 9. Total catch of Pacific Ocean Perch in the Gulf of Alaska and off Pacific Northwest combined in thousand metric tons round weight, 1962-74.



From: Alverson, Dayton L., Director, Northwest Fisheries Center, National Marine Fisheries Service, Seattle, Washington. Interview, June 3, 1976.

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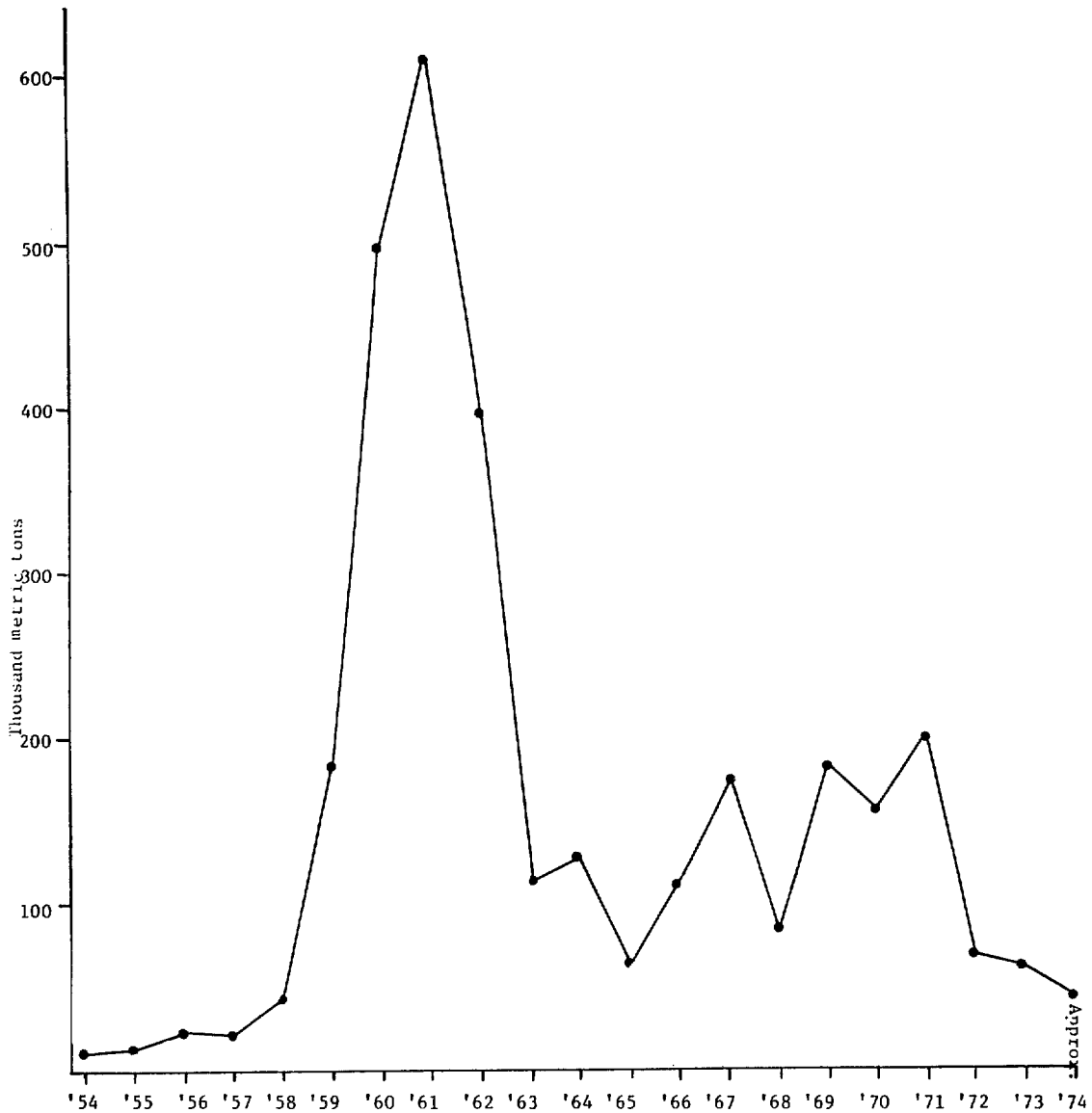
Figure 10. Total Catch. Yellowfin Sole in Eastern Bering Sea in thousand metric tons, 1954 - 74.



Source of statistics: Low, Loh Lee. Status of Major Demersal Fishery Resources of the Northeastern Pacific: Bering Sea and Aleutian Islands. "Northwest Fisheries Center Processed Report," Seattle, WA: Northwest Fisheries Center (NMFS) April 1976, p. 83.

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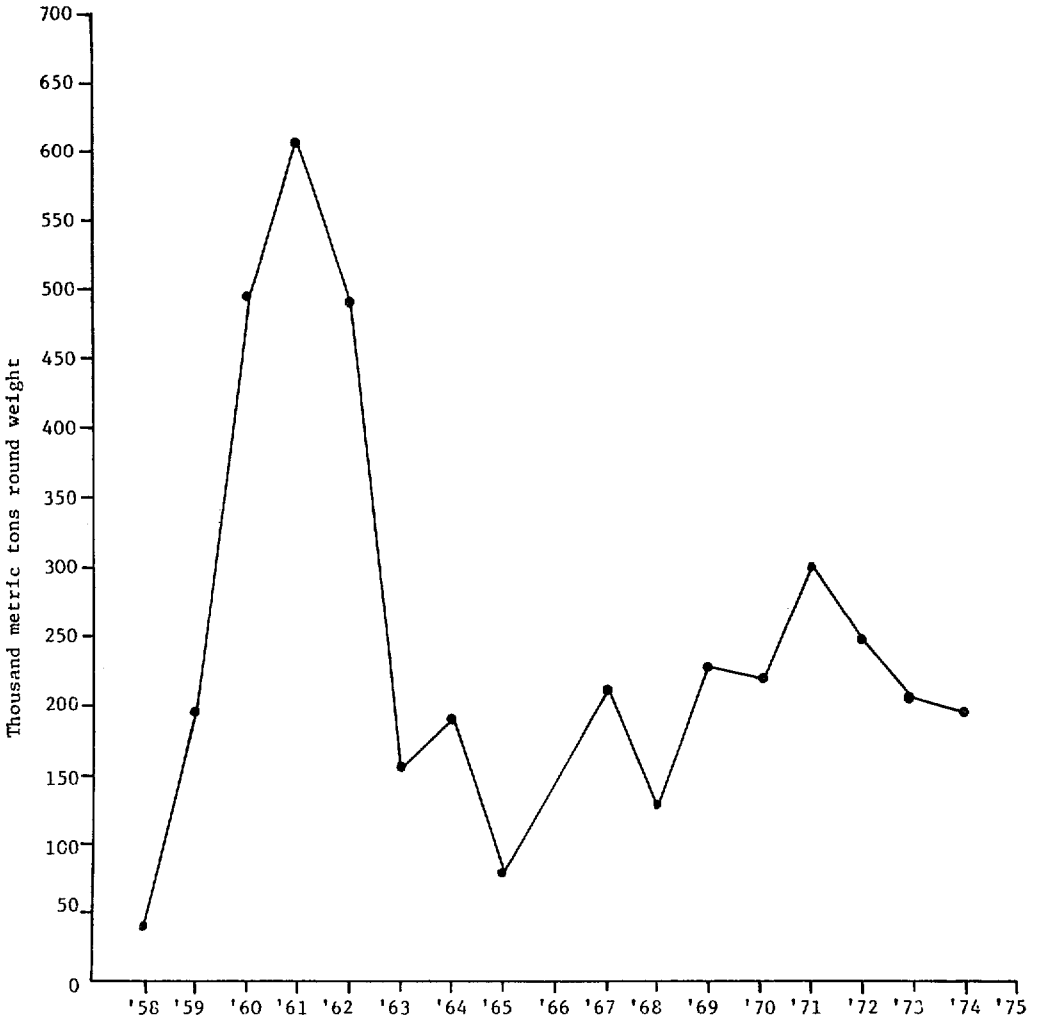
Figure 11. Total Catch of Flatfishes in the Bering Sea and Aleutian Region combined in thousand metric tons round weight, 1958-74.



Source of statistics: Low, Loh Lee. Status of Major Demersal Fishery Resources of the Northeastern Pacific: Bering Sea and Aleutian Islands. "Northwest Fisheries Center Processed Report;" Seattle, WA: Northwest Fisheries Center (NWFS), April 1976, p. 75.

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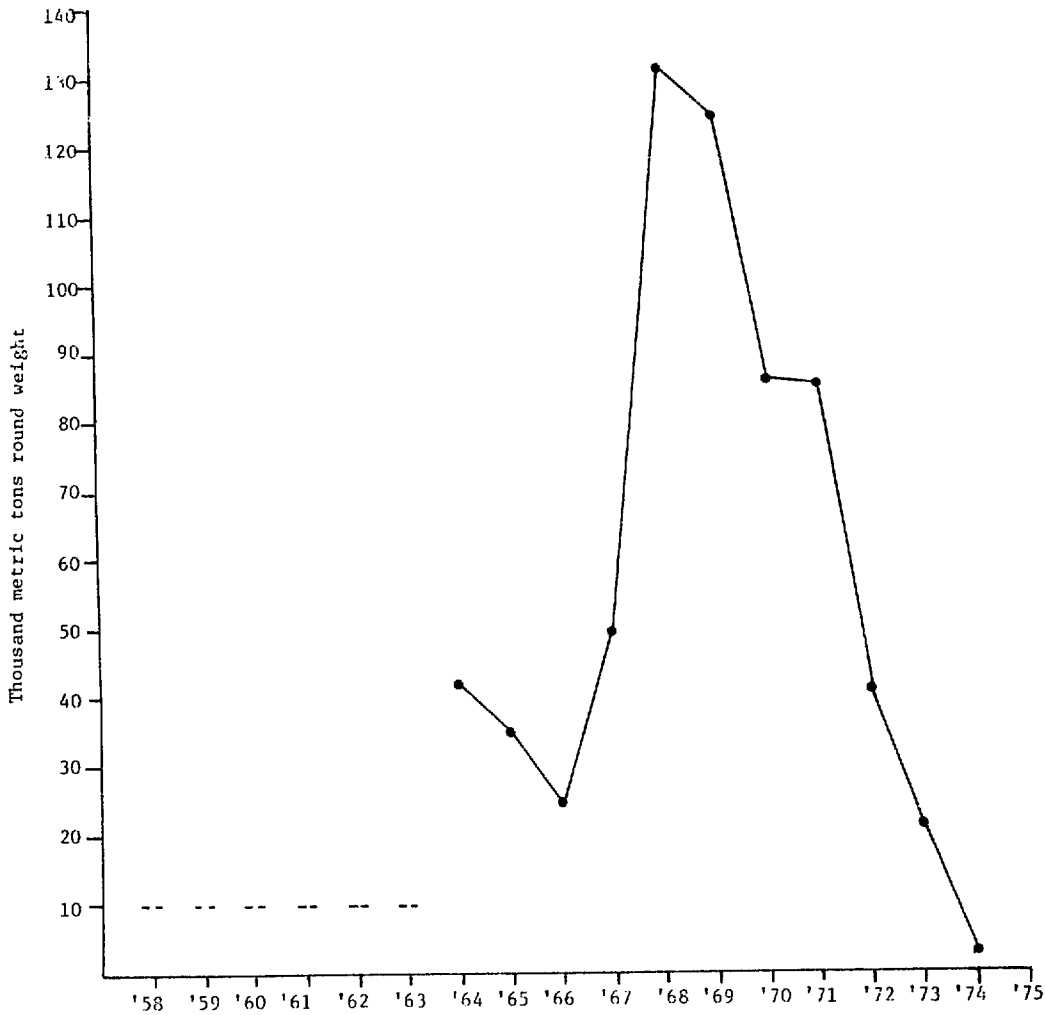
Figure 12. Total catch of Herring in the Bering Sea and Aleutian Region combined in thousand metric tons round weight, 1958-74.



fishing effort by the United States and foreign fishermen has not in all cases been so great as to reduce the productivity of the stocks, still the catch by foreign fishermen has been of such a magnitude so as to significantly increase the cost of fishing to United States-flag vessels and thus decrease the net return to domestic fishermen. That appears to be the case in several of the New England groundfish fisheries.

Also, foreign fishermen physically interfere with American fishermen on fishing grounds off the United States coast traditionally fished by coastal fishermen. In the early years of the expansion of foreign fisheries on Georges Bank in New England, foreign fleets, fishing virtually in formation, drove the smaller United States coastal vessels off the traditional fishing grounds. Picture a 3,000 ton factory trawler of the Soviet Union--or more often ten such vessels--trawling side by side across the fishing grounds and bearing down on a single 200 ton United States flag vessel, one-tenth or less the size. Because of the physical presence of large numbers of foreign fishing vessels, and resulting concern over losing both fishing gear and fishing time, the American coastal fishing fleet has suffered a significant reduction in effectiveness. The same thing has occurred off the Pacific Northwest coast of the United States where fleets of factory trawlers, 3,000 tons or more, from the Soviet Union have physically interfered with the salmon trolling and coastal groundfish fleet of the Pacific Northwest.[10]

Foreign fleets have also caused severe damage to the stationary fishing gear of the United States on the Atlantic Coast, especially to lobster traps. The gear losses have caused a great deal of difficulty and economic loss to the United States lobster fishermen. And, on the Pacific Coast, particularly in the Gulf of Alaska and Bering Sea, destruction of king crab traps by Japanese and Soviet trawlers and the destruction of set halibut fishing gear by the large foreign trawlers have caused additional loss to American fishermen. This loss of gear became such a problem that a claims settlement board has been established by the United States and U.S.S.R. It must also be mentioned that the recent development of the offshore lobster fishery by the United States using fixed traps, interfered with the fishing by foreign fishermen on fishing grounds they had fished for several years.

As a result of this intimidation by the large numbers of foreign vessels fishing on common fishing grounds with United States fishermen, the American fleet has avoided good fishing areas so as to prevent the loss of valuable and expensive fishing gear. However, in recent years bilateral agreements between the United States and a number of foreign countries whose fishermen fish off the coast of the United States have moderated the conflicts between United States and foreign fishermen.

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[10]Evidence submitted by Coast Guard, NMFS, and substantiated reports by fishermen to Department of State over the period 1960 to 1974.

THE FISHERIES CONVENTIONS AND THEIR PURPOSE

The United States is a member of eight international organizations concerned with fishery or marine mammal management. These Commissions have as their primary purpose the conservation of fishery resources fished by two or more countries. Usually, a Commission is established with membership from each member country. Statistical and scientific committees coordinate the accumulation of technical data and assessment of the status of stocks of concern to the particular Commission. Table 2 gives a list of these conventions, their acronyms, date established and auspices, membership, area of competence, resources covered, and management responsibility. All are multilateral or bilateral conventions that have management responsibilities. A number of these (the International Pacific Halibut Commission, the International Pacific Salmon Fisheries Commission, the Inter-American Tropical Tuna Commission and the International Commission for the Conservation of Atlantic Tunas) have independent scientific staffs with responsibilities for gathering scientific information and making independent recommendations to their respective Commissions for the management of stocks under their purview.

On the other hand, the International North Pacific Fisheries Commission, the North Pacific Fur Seal Commission, the International Whaling Commission, and the International Convention for Northwest Atlantic Fisheries all depend upon the scientific and technical staffs of member countries. Scientific and technical committees carry out scientific investigations and then formulate recommendations for the management of the stocks under the purview of the commission.

Still another type, sponsored by the Food and Agricultural Organization, includes such Commissions as the Indo-Pacific Fisheries Council, the Indian Ocean Fisheries Commission, and the Fishery Committee for the Eastern Central Atlantic. They promote programs of fishery development and conservation and encourage cooperation between member nations. They have no management functions per se. There are a number of other regional fisheries conventions in various parts of the world ocean. They are briefly described in Table 3.

The first category of convention, those with management responsibilities, tend to have been established to manage the fisheries for maximum sustainable yield of the resource and have little responsibility for either the economic return from the fishery or for the allocation of the catch among the members. There are some exceptions to this. For example, the North Pacific Fur Seal Commission specifically allocates the harvest among member nations. It provides that the harvest of fur seals be carried out on the rookeries which happen to be islands under the sovereignty of the Soviet Union and the United States. However, beyond this, the convention calls for studies to ascertain the permissible catch of fur seals and allocates 15 percent to Japan and the same to Canada. These nations in return have discontinued pelagic (high seas) seal hunting.

Commission Name	Acronym	Date Established and Auspices	Membership
Inter-American Tropical Tuna Commission	IATTC	1949 International Convention	Canada, Costa Rica, France, Japan, Mexico, Nicaragua, Panama, United States of America
International Commission for the Conservation of Atlantic Tunas	ICCAT	1966 International Convention	Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Republic of Korea, Morocco, Portugal, Senegal, South Africa, Spain, United States of America
International Commission for the Northwest Atlantic Fisheries	ICNAF	1949 International Convention, as amended	Bulgaria, Canada, Denmark, France German Democratic Republic, Federal Republic of Germany, Iceland, Italy, Japan, Norway, Poland, Portugal, Romania, Spain, U.S.S.R., United Kingdom, United States of America
International North Pacific Fisheries Commission	INPFC	1952 International Convention	Canada, Japan, United States of America
International Pacific Halibut Commission	IPHC	1953 International Convention	Canada, United States of America
International Pacific Salmon Fisheries Commission	IPSFC	1930 International Convention, as amended	Canada, United States of America
International Whaling Commission	IWC	1946 International Convention, as amended	Argentina, Australia, Brazil, Canada. Denmark, France, Iceland, Japan, Mauritius, Norway, Panama, South Africa U.S.S.R., United Kingdom, United States of America

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Area of Competence	Resources Covered	Management Responsibility
Eastern Pacific Ocean	Yellowfin and Skipjack tuna, fish used as bait for tuna and other fish taken by tuna vessels	To carry out research on tuna by own research staff; to recommend joint action for conservation.
Atlantic Ocean, including the adjacent seas	Tuna and tuna-like Fishes and other species exploited in tuna fishing	To carry out studies; to recommend conservation action.
Northwest Atlantic, (eastern limit approximately 42°W longitude, southern limit approximately 39°N latitude), excluding territorial sea	All, but with particular reference to cod group, flatfish and rosefish	To carry out studies and research; to propose action for stock conservation through closed areas and seasons, size limitation, gear control, catch limits. 21
All waters of North Pacific and adjacent seas, excluding territorial waters	All, with particular reference to halibut, herring and salmon	To study fish stocks; to recommend joint conservation action; to administer abstention system.
Territorial sea and high sea off western coast of Canada and United States	Halibut (Hippoglossus)	To study halibut stocks, to adopt conservation measures such as catch regulation, size control, open or closed seasons, yes and gear control, licensing.
Frazer river and its tributaries, territorial sea and high seas off the estuary	Sockeye and Pink salmon	To carry out investigations; to adopt conservation measures such as gear control, catch regulation, apportionment of catches.
All waters in which whaling is prosecuted by factory ships, land stations and whale catchers	Whale stocks	To promote or carry out studies and research; to adopt conservation measures such as open and closed seasons or areas, size limitation, catch limits.

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TABLE 2 (continued)

Commission Name	Acronym	Date Established and Auspices	Membership
North Pacific Fur Seals Commission	NPFSC	1957 International Interim Convention as amended (New Convention wording agreed on, December 1975.)	Canada, Japan, U.S.S.R., United States of America

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Area of Competence	Resources Covered	Management Responsibility
North Pacific Ocean	Fur Seals	To formulate and coordinate research programs; to recommend conservation measures in respect of size, sex and age composition of the seasonal commercial kill from a herd; to make recommendations regarding methods of sealing.

[1]United Nations, Food and Agriculture Organization Department of Fisheries. Report on FAO, the FAO Committee on Fisheries and International and Regional Fishery Bodies. "Doc. FID/C/331;" Rome: FAO, 1975. pp. 41-52.

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TABLE 3

OTHER REGIONAL FISHERY BODIES[1]
(1975 Membership)

Commission Name	Acronym	Date Established and Auspices	Membership
Regional Fisheries Advisory Commission for the Southwest Atlantic	CARPAS	1961 Resolution of FAO Conference under Article VI-1 of FAO Constitution	Argentina, Brazil, Uruguay
Fishery Committee for the Eastern Central Atlantic	CECAF	1967 Resolution of FAO council under Article VI-2 of FAO Constitution	Cameroon, People's Rep. of the Congo, Dahomey, France, Gabon, Gambia, Ghana, Greece, Guinea, Italy, Ivory Coast, Japan, Republic of Korea, Liberia, Mauritania, Morocco, Nigeria, Norway, Poland, Romania, Senegal, Sierre Leone, Spain, Togo, United Kingdom, United States of America, Zaire
General Fisheries Council for the Mediterranean	GFCM	1949 International Agreement under aegis of FAO (Article XIV of FAO Constitution).	Algeria, Bulgaria, Cyprus, Arab Republic of Egypt, France, Greece, Israel, Italy Lebanon, Libyan Arab Republic, Malta, Monaco, Morocco, Romania, Spain, Tunisia Turkey, Yugoslavia

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TABLE 3 (continued)

Commission Name	Acronym	Date Established and Auspices	Membership
Japan-Republic of Korea Joint Fisheries Commission	JKFC	1965 International Agreement	Japan, Republic of Korea
Japan-Soviet Northwest Pacific Fisheries Commission	JSFC	1956 International Treaty	Japan, U.S.S.R.
Mixed Commission for Black Sea Fisheries	MCBSF	1959 International Convention	Bulgaria, Romania, U.S.S.R.
Northeast Atlantic Fisheries Commission	NEAFC	1959 International Convention	Belgium, Denmark, France, German Democratic Republic, Federal Republic of Germany, Iceland, Ireland, Netherlands, Norway, Poland, Portugal, Spain Sweden, U.S.S.R., United Kingdom
Permanent Commission of the Conference on the Use and Conservation of the Marine Resources of the South Pacific	PCSP	1952 International Agreement, as Supplemented	Chile, Ecuador, Peru

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TABLE 3 (continued)

Area of Competence	Resources Covered	Management Responsibility
Southwest Atlantic	All	To develop organized approach in respect of rational exploitation of resources, to encourage cooperative investigations.
Eastern Central Atlantic Between Cape Spartel and the Congo River	All	To promote rational utilization of resources; to encourage scientific research and training; to collect and disseminate information.
Mediterranean Sea and Contiguous Waters	All	To formulate various aspects of the problems of development and proper utilization of resources; to encourage research and development; to assemble and disseminate information.

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Area of Competence	Resources Covered	Management Responsibility
Joint resources survey and regulation zones off the coast of Korea	All	To recommend scientific investigations and conservation measures, including provisional regulatory measures.
Northwest Pacific, including Sea of Japan, Sea of Okhotsk and Bering Sea, and excluding territorial waters	All, with particular reference to salmon, trout and herring	To coordinate joint scientific research programs; to adopt joint conservation measures, including amount of total catch.
Black Sea	All	To coordinate scientific research; to develop industrial fishing techniques; to formulate conservation measures.
Northeast Atlantic and Arctic Oceans and their dependent seas (western limit approximately 42°W Longitude, southern limit 36°N Latitude, eastern limit 51°E Longitude)	All	To keep all fisheries under review; to recommend conservation measures in respect of mesh sizes, size limitation, gear control, closed seasons and areas, amount of total catch or fishing effort.
South Pacific	All	To promote research; to adopt conservation measures including protection of species, open and closed seasons and areas, gear control.

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TABLE 3 (continued)

Commission Name	Acronym	Date Established and Auspices	Membership
Sealing Commission for the Northeast Atlantic	SCNEA	1957 International Agreement	Norway, U.S.S.R.
Shellfish Commission for the Skagerrak-Kattegat	SCSK	1952 International Agreement	Denmark, Norway, Sweden
Western Central Atlantic Fishery Commission	WECAFC	1973 Resolution of FAO Council under Article VI-1 of FAO Constitution	Brazil, Columbia, Cuba, France, Guatemala, Guinea, Guyana, Haiti, Italy Jamaica, Japan, Republic of Korea, Netherlands, Nicaragua, Poland, Senegal, Spain, Pogo, Trinidad and Tobago, United Kingdom, Zaire 28

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TABLE 3 (continued)

Area of Competence	Resources Covered	Management Responsibility
Northeastern Atlantic east of Cape Farewell, including the Greenland and Norwegian seas, the Denmark Strait, the area of Jan Mayen Island and the Barents Sea	Stocks of seals, including the Greenland seal, the hooded seal and the walrus	To formulate proposals in respect of scientific research and conservation measures, including closed seasons and areas, and total catch quotas.
Skagerrak and Kattegat waters (bounded on the west by a line from Lindesnes light and on the east by the 13th meridian east of Greenwich)	Deep-sea prawns, European lobsters, Norway lobsters and crabs	To coordinate scientific and practical research to recommend conservation measures.
Western Central Atlantic Ocean	All	To promote collection of statisitcs; to facilitate the coordination of research programs; to assist member governments in establishing national policies. 29

[1]United Nations, Food and Agriculture Organization Department of Fisheries. Report on FAO, the FAO Committee on Fisheries and International and Regional Fishery Bodies. "Doc. FID/C/331;" Rome: FAO, 1975. pp. 41-52.

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In the case of the International North Pacific Fisheries convention, the terms of the tripartite convention of Canada, Japan, and the United States give primary consideration to principles of conservation. However, the convention also calls for the abstention from fishing by Japan for halibut, salmon, and herring found off the coast of Canada and the United States. Herring and Bering Sea halibut stocks have been taken off the abstention list since the Convention came into force in 1954. But Japan still abstains from fishing salmon of North American origin east of 175° west longitude, the so called "abstention line." Thus, this convention not only provides for cooperation in the conservation of resources of common concern between the three countries, but also substantially limits Japan's take of salmon of North American origin and halibut from the eastern North Pacific Ocean.

The International Pacific Salmon Fisheries Convention between Canada and the United States calls for the conservation and rehabilitation of sockeye and pink salmon occurring in convention waters (the Frazer River of Canada, its tributaries and the territorial sea and high seas off the estuary). However, this convention goes beyond a strictly management function to provide for an equal division of the catch of these two species of Pacific salmon between the United States and Canada within Convention waters.

With respect to recent amendments (January 1, 1974) to the International Convention for the Northwest Atlantic Fisheries, recent amendments (January 1, 1974) permit "economic and technical considerations," in addition to scientific considerations, to serve as the basis for joint action by contracting governments. These amendments in conjunction with earlier amendments to the ICNAF Convention provide not only for the conservation but now the allocation of the fish stocks of the Northwest Atlantic among member nations, taking into account economic and technical considerations.

But with these exceptions, the vast majority of bilateral and multilateral fishery conventions have been concerned almost solely with the conservation of the resources; i.e., the achievement of the maximum physical yield from the resource. This objective was reasonably well met in the early years of the conservation conventions and during the years following World War II. It was during the years from 1945 through about 1960 that these agreements achieved considerable success. The International Pacific Halibut Commission succeeded in rehabilitating depleted halibut stocks; the International Pacific Salmon Fisheries Commission has brought about a very substantial increase in the stocks of pink and red salmon of the Frazer River; the International North Pacific Fisheries Commission permitted the United States to rehabilitate stocks of salmon in Bristol Bay; and the International Commission for the Northwest Atlantic Fisheries was successful during its earlier years at conserving cod and other stocks of fish of the Northwest Atlantic. In recent year, however, as a result of the tremendous growth in fishing

effort accompanied by the lack of adequate methods to deal with this increased effort and the increased number of nations participating, overfishing of major stocks of living marine resources off the coast of the United States has occurred.

THE EXECUTIVE BILATERAL AGREEMENTS

With the increase in foreign fishing off the coast of mainland United States and Alaska, as mentioned in the previous section, and with the subsequent conflicts that arose as a result of the physical presence of these vessels in waters off the United States coast, it became evident that there was a need for improved operating procedures by foreign and domestic fishermen to minimize conflicts arising from competition for common stocks of fish and/or common fishing grounds. A common complaint by United States fishermen was that their fixed fishing gear (halibut set lines and crab and lobster pots off both the Pacific and Atlantic coasts), were being destroyed by the large foreign trawl vessels.

A series of bilateral executive department agreements were negotiated with the Soviet Union, Japan, Canada and several other nations to resolve these specific problems. The purpose of these agreements was not to set new ocean policy, but to reach an understanding with foreign fishermen so that the economic interests of the United States fishing industry could be better protected while the rights of foreign fishermen on the high seas could also be preserved.

There are presently 11 of these agreements in effect for the Atlantic and Pacific Oceans. These bilateral agreements have tended to provide guidelines for governing the conduct of foreign and United States vessels fishing primarily off the coast of the United States. In general, they have succeeded in minimizing conflict between United States and foreign fishermen and have reduced--but not eliminated--economic losses to United States fishermen. Table 4 gives a list of these bilateral agreements and their purpose. The Agreements are included as Appendix I of the report.

A REGIONAL ASSESSMENT OF THE EFFECTIVENESS OF INTERNATIONAL FISHERIES TREATIES AND EXECUTIVE AGREEMENTS

In this discussion, treaties will be considered in relation to general geographic regions established under the Fishery Conservation and Management Act of 1976. While a number of the international treaties overlap the boundaries of the regions established by the Act, it nevertheless appears appropriate to consider by region what effect the extension of jurisdiction and the new management regimes will have on these treaties and on the foreign fisheries and governments party to the treaties.

APPENDIX VI

Table 4

Bilateral Agreements Dealing With Fishery Matters

Agreement	Parties	Date Entered into Force
Agreement Concerning Shrimp	Brazil, U.S.A.	February 14, 1973
Agreement on Reciprocal Fishing Privileges in Certain Areas Off the Coasts of the United States and Canada	Canada, U.S.A.	April, 15, 1973
Agreement Concerning Certain Fisheries Off the Coast of the United States --Agreement Concerning Salmon Fishing --Note of the Government of Japan Concerning Dragnet and Longline Fishing in Certain Waters --Note of the Government of Japan Concerning Enforcement	Japan, U.S.A.	December 24, 1974
Agreement Concerning an International Observer Scheme for Whaling Operations from Land Stations in the North Pacific Ocean	Japan, U.S.A.	April 23, 1974
Agreement Concerning King and Tanner Crab Fisheries in the Eastern Bering Sea --Note of the Government of Japan Concerning Procedures Relating to Incidental Catches of King and Tanner Crabs	Japan, U.S.A.	December 24, 1974
Agreement Regarding Fisheries in the Northeastern Pacific Ocean Off the Coast of the United States	Polish People's Republic, U.S.A.	January 1, 1976.
Agreement Regarding Fisheries in the Western Region of the Middle Atlantic Ocean	Polish People's Republic, U.S.A.	July 1, 1973

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Agreement	Parties	Date Entered into Force
Agreement Concerning Cooperation in Fisheries	Republic of Korea, U.S.A.	December 12, 1972
Agreement on Certain Fishing Problems on the High Seas in the Western Areas of the Middle Atlantic Ocean	U.S.S.R., U.S.A.	July 1, 1973
Agreement Regarding Fisheries in the Northeastern Pacific Ocean Off the Coast of the United States of America	U.S.S.R., U.S.A.	August 1, 1975
Agreement Relating to Fishing for King and Tanner Crab	U.S.S.R., U.S.A.	August 1, 1975

Alaska and the Bering Sea

All foreign fishing now taking place off the United States coast takes place within the 200-mile limit except for Japanese high seas salmon fishing west of 175° West longitude in waters adjacent to the Aleutian Islands. The Northeastern Pacific and Bering Sea groundfish fisheries of Japan, the U.S.S.R., Korea and Taiwan take place within the 200-mile zone of the United States and Canada. These fisheries are, to one degree or another and with the exception of the small effort by Taiwan flag vessels, being conducted within the framework of existing international treaties and executive agreements.

The International North Pacific Fisheries Convention includes Canada, Japan, and the United States. Convention waters include all waters, other than the territorial waters, of the North Pacific Ocean (see Table 2). After several years of study beginning in 1955, it was found that significant amounts of salmon of North American origin migrated west of the provisional abstention line at 175° West longitude. Thus the Japanese, in conducting their high seas salmon fisheries west of this line, were taking substantial quantities of salmon of North American origin. The Japanese fishery was found to be harvesting sockeye salmon from Bristol Bay, Alaska. Attempts were made within the Commission to move the abstention line further west after discovering the extent of the Japanese interceptions of Bristol Bay sockeye salmon. These attempts were resisted by Japan and the abstention line remains at 175° West longitude. Nevertheless, the INPFC has been helpful in preventing depletion of those stocks such as salmon and halibut fished by all three member nations, Canada, Japan, and the United States. It has also encouraged cooperation among member nations in gathering scientific information for stock assessment. On the other hand, the limited membership of Canada, Japan, and the United States and the restricted objectives of the Convention, have meant that the Convention has been useful only with respect to the relatively narrow objectives of the Convention and thus has applied only to the three member nations. It is reasonable to conclude that Japan has viewed the Convention as more restrictive of Japan's fishermen and of less utility than to the fishermen of Canada and the United States.

The North Pacific Fur Seal Convention will also come under review with the extension of United States fishery jurisdiction. Since its inception, this Convention has been uniquely successful in accomplishing its objectives. The Pacific fur seal herd was reduced by Soviet, American, Canadian, and Japanese hunters at about the turn of the last century to a total of approximately 110,000 animals by about 1911. Since that time, international conservation agreements among the four sealing nations of the North Pacific Ocean, Canada, Japan, the United States, and the U.S.S.R., have permitted a rehabilitation of these resources until in recent years fur seals have numbered well over one million animals and the production rate has been between 30 and 60 thousand animals a year on a sustainable basis.

The International Pacific Halibut Convention between the United States and Canada provides for a Commission and a separate scientific staff which carries our conservation and management studies on Pacific halibut. The Pacific halibut fishery is located almost entirely within 200 miles of the coasts of the United States and Canada, from the northern Bering Sea to the coast of Oregon. However, most of the fishing occurs off the Alaskan coast of the United States, although many United States vessels from Pacific Northwest ports in the United States fish off the coast of British Columbia. The long and successful history of this particular conservation convention and the excellent relations existing between the United States and Canadian government and fishermen would seem to dictate that the International Pacific Halibut Commission will continue after the United States extension of fishery jurisdiction. However, some consideration should be given to the allocation of the catch, with an increased proportion going to the United States since the majority of the halibut resource is located within 200 miles of the United States coast. In recent years, the incidental catch of Pacific halibut by Japan and the U.S.S.R. have apparently contributed to a reduction in the productivity of Pacific halibut (Figs. 5 and 6).

The International Pacific Salmon Fishery Commission, another bilateral convention between the United States and Canada, has provided for the successful rehabilitation of the Frazer River stocks of sockeye and pink salmon. The Frazer River salmon were decimated during the early years of the twentieth century when railroad construction in the Frazer River canyon of Canada dumped thousands of tons of rock in the river and almost completely blocked the upstream migration of adult salmon to their spawning areas. Cooperative studies by scientists of the two countries provided evidence of this block and fish ladders were installed in the Frazer River during the 1930's permitting the salmon to continue their upstream migration. Since that time, the Frazer River sockeye salmon runs have been increasing, and the two nations have been cooperating successfully in the conservation and management of these stocks.

In very recent years both countries have sought to amend the present convention, and currently negotiations are under way to revise the Convention and alter the allocation of the catch between the fishermen of the two countries. The United States and Canada have become increasingly concerned about interceptions by fishermen of both countries of salmon bound for the rivers of each country, and they have agreed in principal to attempt to reduce these interceptions. It is likely that in the near future a new and revised international convention, governing the conservation and management of the salmon stocks of common concern between Canada and the U.S., will be negotiated to attempt to resolve this problem.

Executive agreements pertaining to the North Pacific Ocean and Bering Sea will be significantly altered by the extension of fishery jurisdiction. If the time comes when the foreign countries, whose fishermen fish in the area, accept the extended 200-mile fisheries

APPENDIX VI

jurisdiction of the United States, there will be little need for such executive agreements. Until such time, existing bilateral executive agreements will probably need to be renegotiated with a view towards improving conservation measures in the Northeastern Pacific Ocean and Bering Sea and to take into account the extension of fisheries jurisdiction to 200 miles by the United States.

In summary, there are about six foreign nations actively engaged in fishing off the coast of Alaska and in the Bering Sea.[11] There are up to 300 foreign fishing vessels fishing in this area during the year, taking two to two and one-half million metric tons of fish. These foreign fisheries have substantially reduced the stocks of groundfish off the coast of Alaska and stocks of salmon of the Bering Sea and Aleutian Islands, obviously reducing the potential harvest to American fishermen. However, the international treaties and executive agreements, which relate to the Gulf of Alaska and Bering Sea, have been partially successful in preventing overfishing and minimizing the adverse effects of increased foreign fishing effort on United States fisheries. Of these several conventions and agreements, the North Pacific Fur Seal Commission, the International Pacific Halibut Commission, and the International Pacific Salmon Fisheries Commission continue to be particularly effective. With regard to the International North Pacific Fisheries Commission and the bilateral executive agreements, these agreements have served a limited but useful purpose and will be replaced by new and more effective arrangements negotiated in the context of the Conservation and Management Act of 1976 (PL 94-265).

The Pacific Coast States

Extensive foreign fishing occurs in the coastal waters of California, Oregon, and Washington. The International Pacific Salmon Fisheries Commission, involving the pink and sockeye salmon of northern Puget Sound and southern British Columbia, is the major international commission in the geographic area encompassed by the Pacific Council proposed under the Fishery Conservation and Management Act of 1976, (although the International North Pacific Fisheries Commission has some responsibilities in the area with respect to fisheries of Japan, the United States, and Canada). As mentioned previously, negotiations are currently taking place between the United States and Canada to redefine the limits of the Salmon Commission, incorporating additional species of salmon of common concern to both countries. It will permit an improved method of coordination for research and management of salmon runs migrating along the coast of the United States and British Columbia to southeastern Alaska. Salmon troll fishermen from the United States fish off the coast of British Columbia and substantial numbers of Canadian salmon trollers fish off the coast of southeastern Alaska as far north as Cape Spencer and to the

[11]Canada, Japan, Poland, South Korea, Taiwan, and the U.S.S.R.

south as far as the Columbia River. Canadian fishermen also fish offshore of California, Oregon, and Washington for albacore tuna during the summertime. In addition, a fleet of about 25 to 30 U.S. groundfish trawlers fish the inside waters of British Columbia (Queen Charlotte Sound and Hecate Strait). These joint U.S.-Canadian fisheries have not been under any effective joint agreement although both governments have long realized the need for joint management programs.

The current executive agreement with Canada relating to reciprocal fishing within the 3- to 12-mile fishing zone of either country has provided for stability in the management and continued fishing of traditional fishing grounds by the fishermen of both countries. According to provisions of the Fishery Conservation and Management Act of 1976 (Sec. 202, b), it will be necessary to renegotiate the bilateral executive agreement with Canada before March 1, 1977 if there is to be a continuation of the reciprocal fishing rights within the 200-mile zone by fishermen of both countries.

The bilateral executive agreements with the Soviet Union, Poland, and Japan, regulating the fisheries of these countries off the Pacific Northwest have reduced conflict between the foreign and domestic fishermen, but unfortunately the large fishing effort coupled by inadequate control of the foreign fishermen have resulted in substantial overfishing of Pacific Ocean perch and reductions in the Pacific hake and black cod stocks. Again, the FCMA requires renegotiation of the agreements to conform to the provisions of the act.

The Atlantic Coast States

On the Atlantic coast, the International Convention for Northwest Atlantic Fisheries is the major international fishery agreement although there are bilateral executive agreements with Canada, Poland, and the U.S.S.R. The ICNAF Convention and the executive bilateral agreements have come under increasing domestic criticisms in recent years as the increasing fishing effort by all nations and lack of uniformly effective control over the fishing has led to depletion of certain stocks such as haddock and yellow tail flounder and a substantial decline in the total fisheries biomass. Without question, the international agreements have prevented wide-spread depletion of fishery stocks off the United States Atlantic coast in recent years, but they have not been effective enough to prevent depletion of some of the smaller stocks of fish, especially those stocks which intermingle on common fishing grounds with the larger stocks of herring and mackerel. United States scientists are convinced that even these abundant dominant species are overfished, and have recommended drastic reductions in fishing effort as a result. The United States coastal fisheries have been adversely affected by the reduction in fish stocks.

American fisheries leaders from the New England and mid-Atlantic area have been very critical of the international agreements and have advocated the unilateral extension of fishery jurisdiction by the United

States government. Many now advocate that the United States abrogate the ICNAF treaty, and unilaterally eliminate all foreign fishing off the coast of the United States out to the 200-mile limit. Obviously, the United States will be obligated to withdraw from the ICNAF convention or to renegotiate the treaty with major modifications because of the FCMA.

In summary, ICNAF and the Atlantic bilateral agreements have not prevented a large decline in the fishery stocks off the coast of the United States. In the past five years, however, the conservation measures taken and the new provisions of the amended convention which permit allocations of the total allowable catch favoring the coastal states, have provided for some rehabilitation of the fish stocks and have prevented more serious economic dislocation of United States Atlantic coast fisheries.

The Gulf of Mexico

There is a relatively small amount of foreign fishing off the coast of the United States in the Gulf of Mexico and the Caribbean. Some Cuban shrimp vessels and Japanese longline tuna and marlin vessels fish off the United States coast in this region, but their impact on either the stocks of fish or American fishermen is minimal.

Several hundred United States flag vessels fish off the coast of Mexico primarily for shrimp and finfish of the snapper family. These United States distant-water fishing vessels will be seriously and adversely affected by an extension of fishery jurisdiction to 200 miles by Mexico and other Caribbean nations.

DISTANT WATER OR WORLD-WIDE FISHERIES AND MARINE MAMMAL TREATIES

The United States-Brazil Shrimp Agreement

This bilateral executive agreement signed on May 9, 1972, and since renegotiated, provides for bilateral or cooperative studies of shrimp and limited fishing by the United States in the 200-mile zone claimed as a territorial sea by Brazil. The agreement was extended in 1974 and has been further extended with certain modifications up to the present date.

In the absence of this agreement, there might have been a serious foreign relations problem with Brazil because of the claim by that country of a 200-mile territorial sea at a time when the United States recognized a 3-mile I.Z. and a 9-mile Contiguous Fishery Zone. The agreement has permitted a continuation of a limited United States shrimp fishery off the coast of Brazil and at the same time has facilitated the improved enforcement and collection of data for eventual improved management of the shrimp fishery of the western tropical Atlantic Ocean and Caribbean Sea.

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Inter-American Tropical Tuna Commission

The Inter-American Tropical Tuna Commission was established by conventions between Costa Rica and the United States on May 31, 1949. At present its membership numbers eight and includes Canada, Costa Rica, France, Japan, Mexico, Nicaragua, Panama, and the United States. In addition, vessels of five other nations are fishing or have recently fished tuna in the area covered by the convention: Bermuda, Colombia, Ecuador, The Netherlands, Antilles, Peru, and Spain.

The primary function of the convention is to inquire into the condition of yellowfin and skipjack tuna and to recommend joint conservation measures so as to manage effectively these species and produce on the average the maximum sustainable yield.

In summary, the Inter-American Tropical Tuna Commission has been highly successful from a technical point of view; that is, the yellowfin and skipjack stocks of Eastern tropical Pacific Ocean have been managed in such a way as to sustain high levels of catch without serious damage to the stocks (even though at the present time there may be some overfishing of yellowfin tuna). Still the political problems within the commission have become increasingly severe in recent years. The developing nations wish to limit the growth of the United States yellowfin fleet and catch, and these smaller, less affluent nations wish to have directly allocated to them a greater proportion of the catch. The United States tuna fishing industry has, of course, resisted this pressure and thus conflict has occurred. The result has been an increasing allocation of catch to the developing nations, particularly Mexico. Because of this and because a number of other countries have entered the fishery, some of whom are not members of the Commission, the proportion of the catch taken by the large and efficient United States fleet has dropped to its present level of about 68 percent. When the regulatory scheme was put into effect, the United States catch was about 90 percent of the total yellowfin tuna taken in the Commission regulatory area. With the imminent extension of jurisdiction by Mexico and other coastal South American states, the United States government will need to make accommodations if it expects to preserve an economic United States distant-water tuna fleet.

International Convention For the Conservation of Atlantic Tunas

The International Commission for the Conservation of Atlantic Tunas was established by a Convention in 1966. Present parties to the Convention include: Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Republic of Korea, Morocco, Portugal, Senegal, South Africa, Spain, and the United States of America.

The Commission (unlike IATTC) has no management function and no permanent scientific staff. One justification for the lack of permanent scientific staff involves the decision to form a working relationship between the Commission and the Food and Agricultural Organization of the

United Nations (FAO). Presumably the investigative function of the ICCAT is carried out with the assistance of FAO staff and facilities. Its orientation is strictly regional and its primary purpose limited to the investigation and study of pouplations of tuna and tuna-like species (Article IV).

The Convention has been in force for slightly over ten years. During this time it has developed a much improved statistical system and its various committees, studying different species and stocks of tuna within the Convention area, have developed much information on the nature of the many species and stocks. The Commission has recommended to member governments conservation action as a result.

Only one species, the northern bluefin tuna, is found consistently in any quantity off the Atlantic Coast of the United States within 200 miles, but this species migrates widely throughout the North Atlantic and is subject to capture by fishermen of several nations as it migrates along the United States and Canadian coasts of North America and at other times of the year is found in the eastern North Atlantic off the coast of western European countries. Extended jurisdiction to 200 miles by the United States, Canada, and western European countries may well alter the catch of bluefin tuna by the fishermen of some countries, but the wide-ranging migratory habits of this species dictate that a regional international convention of one type or another is necessary to conserve the North Atlantic bluefin tuna stocks.

Virtually the same situation prevails with all other species and stocks of Atlantic tunas. The catch of all Atlantic tunas has been about 300,000 metric tons in the past year or two and indications are that several species are now being fished at levels of fishing effort beyond that which will produce the average maximum sustained yield. Reductions in fishing effort must be accomplished by cooperation among nations fishing the resource; thus, the absolute necessity of an international convention much along the lines of the present Convention.

International Whaling Commission

The International Whaling Convention entered into force November 10, 1948. The current members of the Commission are Argentina, Australia, Canada, Denmark, France, Iceland, Japan, Mexico, Norway, Panama, South Africa, the United Kingdom, the United States of America, and the Soviet Union. The Soviet Union and Japan are the major whaling nations in the world today, although there are small land stations in a number of other coastal countries. The major whale hunting takes place in the Antarctic Ocean, with a moderate effort in the North Pacific and North and South Atlantic Oceans.

In recent years, a world controversy has existed over the hunting of whales, with conservationists claiming that all whale hunting must stop or the animals will become extinct. Scientists of the International

Whaling Commission claim, however, that while the harvest of whales during the decades of the 1950's and the 1960's was too heavy, the hunting is now under control, and that the whale catch is less than the growth of the stocks of these animals. Thus, it appears as though the stocks of whales, including many thought to be endangered a few years ago, are on the increase. However, because of the slow growth rate and rate of reproduction, it will be many decades before the stocks of some species of these large marine mammals will again be plentiful.

Considerable whaling in the Atlantic and Pacific takes place within two hundred miles of coastal countries. Thus, whaling will be affected by the extension of jurisdiction and will have an effect on the numbers of these animals taken. Within waters under the jurisdiction of the United States, the taking of whales is already prohibited by the Marine Mammals Act. Whaling in the North Pacific Ocean by Japan and the Soviet Union will be affected by the United States extension of jurisdiction over fisheries to 200 miles.

BROAD EFFECTS OF A 200-MILE FISHERY ZONE

The Fishery Conservation and Management Act of 1976 becomes fully operative on March 1, 1977. The legislation itself has two major objectives. First, it extends the jurisdiction of the United States over fisheries resources to 200 miles. (The United States has exercised control to 12 miles since 1966.) Secondly, it establishes a national program for the conservation and management of living marine resources by establishing a number of regional councils composed of federal and state fisheries officials and specialists from universities, the fisheries industry, and the public. The regional councils, with the Secretary of Commerce, will initiate fisheries management plans called for by the legislation. Without question, this legislation is the most important law ever enacted by the United States with respect to marine fisheries.

Among other things, the law calls for a renegotiation of all international agreements and treaties so as to make them conform to the legislation. Clearly this unilateral assertion of jurisdiction will affect the activities of the close to 1,000 foreign fishing vessels catching on the order of three million tons of fish within the 200-mile limit of the United States. It is unlikely that these nations will casually agree to the extension of jurisdiction by the United States. It seems equally apparent that the establishment of a national policy for the conservation and management of marine fisheries will have a tremendous impact on the activities of all fishermen, foreign as well as domestic.

THE LAW OF THE SEA

It must be kept in mind that, since 1968, the United States has been a member of the United Nations Seabed Committee drafting a new Law of the Sea Convention. The fourth meeting of the Conference of the Law

of the Sea ended on May 7, 1976, with revised single negotiating texts covering the most important issues, including the question of jurisdiction and control over living resources of the sea. The articles dealing with fisheries are in general similar to those found in the Fishery Conservation and Management Act signed by the President. There are some major discrepancies, however, that will require study and will, at least initially, cause difficulties in reaching new agreements with the foreign nations fishing off the United States coast within the 200-mile zone.

The single negotiating text from the Fourth LOS Conference meeting is just that.[12] That is, it is not an agreed text nor has the United States or any other nation of the world agreed to the provisions for the conservation of living resources which are included. On the other hand, the revised text is very similar to the orginal single negotiating text produced at the Geneva LOS meeting of 1975. This indicates that the leaders of the conference believe that the provisions included in the articles on living resources are about as close to a consensus as can be achieved.

LOS AND THE FCMA

The Law of the Sea Convention will consist of four parts, providing agreement can be reached: The first deals with legal regime of the deep-sea bed; the second deals with boundaries, fisheries, the status of islands, and navigation; and the third part deals with regulations of shipboard pollution and the protection and preservation of the marine environment, along with provisions for the conduct of marine scientific research. The recently passed Fishery Conservation and Management Act of 1976 deals with fisheries and other living marine resources. Thus, the problem of consistency between the FCMA and the LOS text is limited largely, but not exclusively, to those articles in the Law of the Sea single negotiating text dealing with living resources. It is conceivable that the differences between the two will be of such a nature that the Congress will accept the text produced by the Law of the Sea Conference and amend the domestic law.

It is more likely, however, that there will be substantial differences between the single negotiating texts and the United States legislation. The Law of the Sea text does not deal with national management provisions, but does refer to fishing controls, enforcement, and dispute settlement questions within the 200-mile zone and the high seas beyond. For example, one major difference between the single negotiating text and the United States law, involves the treatment of highly migratory species of fish such as tuna. The provisions of the Law of the Sea text give the coastal state control over the highly migratory species within its 200-mile exclusive economic zone, while the United States legislation specifically excludes highly migratory species from the exclusive management authority

[12]The Fifth meeting of the U.N. Law of the Sea Conference will take place from August 2 through September 17, 1976. It is unlikely that the Conference will complete its task by the end of that meeting.

of the coastal nation (Section 103). The FCMA requires that the Secretary of State initiate and conduct negotiations for the purpose of entering into international fisheries agreements providing for the conservation and management of highly migratory species such as tuna. This is in contrast to the single negotiating text which encourages the establishment of international commissions but also gives coastal states exclusive control over tuna within its exclusive economic zone.

Another difference between the Law of the Sea text and the FCMA involves anadromous species such as salmon. The Law of the Sea single text gives the coastal state responsibility for salmon stocks originating within its waters, and requires all other states to cooperate with the state of origin to insure conservation and rational management. Enforcement of regulations regarding anadromous stocks, caught beyond the exclusive economic zone of the host state, is to be by agreement between the state of origin and the harvesting state. The FCMA, however, gives the United States exclusive management authority over anadromous species throughout their migratory range, including the high seas beyond the 200-mile fishery conservation zone. The bill does indicate, though, that such management authority will not extend to salmon and other anadromous species during the time they are found within any foreign nation's territorial sea or fishery conservation zone. In such a case, the Act requires that negotiations be conducted by the two nations in order to provide for the effective conservation and management of anadromous species.

An additional major area of difference between the fishery articles of the Law of the Sea single text and our Fishery Conservation and Management Act is with regard to enforcement. The new United States legislation provides for absolute enforcement by the United States within the fishery zone and permits imprisonment of individuals and forfeiture of vessels if any violation of United States regulations should occur. The new LOS single text (Article 61), however, gives the coastal state broad enforcement powers within the zone but stops short of permitting imprisonment or confiscation of property. This is a rather substantial difference, and there will be an additional question of whether the Congress will be willing to forego the right of the United States courts to apply corporal punishment to foreign fishermen found violating United States fishery regulations. In spite of this, nevertheless, one must conclude that the differences between the current single text and the Fishery Conservation and Management Act recently passed by Congress are relatively small. Both give the coastal states wide authority and jurisdiction over living resources and broad powers to enforce its regulations on foreign vessels, as well as on its own flag vessels fishing in the zone.

The Enforcement Problem

The Fishery Conservation and Management Act provides for absolute coastal nation enforcement of fishing regulations within the 200-mile zone on March 1, 1977. Given that a number of nations (possibly the

majority of nations) now fishing in waters within 200-miles of the United States, will not accept our unilateral assertion of exclusive fishery jurisdiction, the United States must decide whether it will strictly enforce its law during the period prior to the time that the new LOS treaty enters into force or until such time as new agreements are negotiated and accepted by Congress. In any case, it seems clear that Congress must permit the executive branch to exercise considerable flexibility in carrying out the enforcement provisions of the Act (Section 311) in order to avert serious disputes with friendly nations. It is also believed that the United States executive branch can negotiate more effective enforcement procedures with countries fishing off our coast on a bilateral basis than on a multilateral basis; however, it is unlikely that such negotiated provisions would satisfy the current provisions of the law.

The FCMA calls for the responsible United States government authorities to enforce the provisions of the Act with or without a warrant or other due process, and in that respect, officials may arrest any person if there is reasonable cause to believe that person has committed an act prohibited by Section 307 of the Act (which lists the specific prohibited acts). The appropriate government authority may board, search, and inspect any fishing vessel subject to the provisions of the Act (i.e., any vessel, foreign or domestic, operating within the 200-mile zone); seize any fishing vessel together with its gear, any fish, or any other evidence if there is reasonable cause to believe a prohibited act has been committed. The provisions of the Act then provide the inspecting United States officer with the authority to issue a citation and to bring the offending person or persons into the United States court for a hearing. Severe penalties may be assessed by the United States courts, including jail sentencing and confiscation of the vessel, gear, and catch.

The current LOS text provides for coastal nation's enforcement within the 200-mile zone and the assessment of reasonable fines against the offending vessels. However, the text would require turning the vessel over to the flag state authorities within a reasonable time period and does not provide for confiscation of catch or vessel or for imprisonment.

It would appear appropriate for the United States Congress to consider further the penalty provisions of the FCMA. They appear too severe and inappropriate for simple violations of fishery regulations.

FISHERIES TREATIES AND THE 200-MILE ZONE

The Fishery Conservation and Management Act requires prompt initiation of renegotiations of any treaty which pertains to foreign fishing within the fishery conservation zone of the United States. Furthermore, there is the strong implication in the law that the United States should withdraw from any treaty that is not consistent with the Act, particularly

if the treaty is not appropriately renegotiated within a reasonable period of time after the date of enactment of the legislation. With respect to the tri-nation International North Pacific Fisheries Commission (United States, Canada, and Japan), the United States is obligated to renegotiate this convention in such a manner as to gain recognition of the United States' exclusive management authority in the Northeastern Pacific Ocean over salmon and groundfish species of fish (flounder, Alaskan pollock, black cod, etc.) which have been under the study and a small measure of control by this Convention.

The United States has already claimed jurisdiction under the 1958 Continental Shelf Convention to king, tanner, and Dungeness crab and the American lobster, among other sedentary shellfish located on its continental shelf. Therefore, these species will not be directly affected by the passage of the new Act.

Canadian fishermen fish halibut, black cod, and salmon off the United States Pacific Northwest coast and the coast of Alaska, and scallops, herring, and some groundfish off the Atlantic coast of the United States. It will be necessary to negotiate an acceptable new bilateral arrangement with Canada since the United States fishermen, in turn, fish halibut, salmon, and groundfish in waters off Canada which will be under exclusive jurisdiction of Canada.[13]

With respect to Japan, the United States unilateral extension of jurisdiction will have a major effect on Japanese high seas fishing for salmon in waters off the Aleutian Islands, both north and south, and will bring the large and extensive Japanese bottomfish fisheries off the coasts of California, Oregon, Washington, the Gulf of Alaska, and the Bering Sea within the jurisdiction of the United States. The Japanese have, in addition, initiated a significant black cod fishery in the Northeastern Pacific Ocean, and this too will be affected by the legislation. Since there is no possibility of an adequate number of states ratifying a Law of the Sea Convention by March 1, 1977, and since renegotiations will have a major impact on Japanese fisheries, negotiations with Japan will undoubtedly proceed slowly and with difficulty. It seems unlikely any new agreement acceptable to Japan could conform absolutely with the provisions of the Fishery Conservation and Management Act. An alternative approach to the renegotiation of the INPFC treaty and the bilateral agreements with Japan would be to negotiate with a review toward providing greater control by the United States, with provisions for continued fishing for those species not fully utilized by the United States fishermen, but ignoring for the moment absolute Japanese acceptance of United States jurisdiction.

Such problems are not expected to occur with regard to Canada, the other member of the INPFC. An acceptable reciprocal agreement with the United States should result with little difficulty.

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[13]Canada has announced its intent to affect jurisdiction of a 200-miles fishing zone on January 1, 1977.

Thus, the area off the coast of the United States on both the Pacific and Atlantic coasts is one of the most important fishing grounds in the world for the Soviet fishing fleets. Without a specific agreement with regard to the continuation of Soviet fishing in these waters and some guarantee for the future, it appears unlikely--in the absence of an effective multilateral Law of the Sea Treaty--that the Soviet Union will accept United States claims to jurisdiction over a 200-mile zone. It is more likely that the U.S.S.R. would be willing to accept greater regulatory authority by the United States in these waters and reduce their fishing effort if they are not obligated to accept the principle of exclusive jurisdiction or sovereignty over fisheries. If that course of action is not acceptable to United States government officials, a serious confrontation over the fishing rights issue with the Soviet Union could result. Still, the possibility exists that the Soviet Union, faced by the prospect of an increasing number of nations asserting jurisdiction over a 200-mile fisheries zone, will also claim such jurisdiction. The Soviet Union would thus gain control over important cod fishing areas in the Barents Sea and of productive fishing areas in the Northwestern Pacific Ocean.

In the Gulf of Mexico there is a minimum of foreign fishing off the United States coast although, as mentioned before, there are several hundred United States flag vessels fishing off the coast of Mexico and other Caribbean coastal nations. The Mexican government has declared a 200-mile fishing zone, and has stated its intent to enforce its authority over this zone. With the extensive Mexican fishery for shrimp off its eastern coast, it will be difficult, if not impossible, to negotiate satisfactorily for a continuation of United States shrimping in waters under Mexican jurisdiction for any prolonged perior of time. Only the few Mexican boats which fish off the coast of Texas and the small number of Cuban boats which wander into the northern Gulf of Mexico will be affected by the United States extension of jurisdiction.

The major fishery agreement on the Atlantic coast affected by the extension of jurisdiction is the International Convention for the Northwest Atlantic Fisheries. The Commission is composed of 17 members including such technologically advanced fishing nations as Canada, the U.S.S.R., and Japan, and such developing Eastern Bloc nations as Romania and Bulgaria. The United States is clearly required by the FCMA to renegotiate this treaty. Setting aside the case of Canada, it is unlikely that many other distant-water fishing nations will readily accept the 200-mile extended jurisdiction of the United States. Such refusals will lead to protracted negotiations. The negotiations are likely to take the form of time-consuming bilateral negotiations in which the United States requests nations to accept an agreement required by the FCMA, the General International Fisheries Agreement (GIFA). It can be anticipated that some of the smaller nations, wishing to maintain good relations and fishing privileges within the United States' zone,

With respect to the International Pacific Halibut Convention (the United States and Canada), a strict interpretation of the Act requires the United States to renegotiate the Convention with a view toward Canada's acceptance of the exclusive management authority of the United States. Canada will probably be willing to accept the requirements of the Fishery Conservation and Management Act with the United States accepting exclusive Canadian jurisdiction within its zone, and it seems likely that the renegotiation of the IPHC will result in a reciprocal agreement permitting a continuation of fishing by United States fishermen in Canadian waters, and Canadian fishermen in United States waters. In renegotiating this treaty, the United States should give consideration to a greater allocation for United States fishermen, since most halibut taken in the Northeastern Pacific Ocean and Bering Sea will be from waters within the 200-mile zone claimed by the United States.

The International Pacific Salmon Fisheries Convention (Canada and the United States), which has resulted in a conservation program for sockeye and pink salmon of the Fraser River, is being renegotiated at the present time. The possibility exists that the two countries will agree to a very broad salmon conservation convention, involving salmon fisheries and salmon stocks of common concern to both countries off the coast of British Columbia, southeastern Alaska, and the Pacific Northwest states. Such a convention will probably permit a continuation of Canadian salmon fishing within the United States 200-mile zone and a continuation of fishing by the United States in Canadian waters. Such a convention should provide for cooperation and coordination of salmon management programs deemed necessary to rationally conserve and manage those stocks of salmon which migrate through the waters of both countries and which are fished by the fishermen of both countries.

With respect to the Japanese and Soviet whaling in the Northeastern Pacific Ocean, the United States without a doubt will prohibit the capture of whales within the 200-mile fishery zone. It may not be necessary for a major renegotiation of the International Whaling Convention, however, since the provisions of the current Convention would apply outside waters under the exclusive control of coastal states. On the other hand, renegotiation of this treaty probably is desirable to take into account current scientific and world opinion of whales and whaling.

A number of bilateral executive agreements regulate fishing by such countries as the U.S.S.R., the Republic of Poland, Korea, and others off the Pacific and Atlantic coasts of the United States. It will be necessary to renegotiate or withdraw from these bilateral agreements. The FCMA calls for the negotiation of a General International Fisheries Agreement (GIFA) between the United States and foreign countries who wish to fish within the 200-mile zone of the United States. With respect to the Soviet Union, as many as a hundred vessels fish off the United States during the year. Their catch of fish in the Northeastern Pacific Ocean and Bering Sea waters is on the order of 500,000 tons and the catch off the Atlantic coast has exceeded 100,000 tons per year in recent years.

will accept United States jurisdiction.[14] In the meantime, disputes with the major fishing nations will continue on into the year 1977.

The bilateral agreements with the Soviet Union and Poland, applying to waters off the Atlantic coast, will not be extended in their present form. These agreements were necessary because of foreign fishing activities in coastal areas beyond 12 miles, heretofore considered to be the high seas. They have been partially successful but have not been adequate to prevent depletion of many of the economically important fishery resources, nor have they prevented physical interferences between United States and foreign fishing vessels and gear. It may be necessary to renegotiate bilaterals with these countries, but if so they will have to be modified substantially in order to conform even in part to the new law.

It seems unlikely that there will be any great surplus of fish over that which the United States fleet can catch. In view of the fact that a number of important species have been overfished, cod, haddock, red hake, yellowtail flounder, herring, and perhaps even mackerel, one can foresee the possibility that the United States will attempt to remove all foreign fishing from the waters within 200 miles of the United States' Atlantic coast, at least until the stocks have been rehabilitated. This would disrupt the fishing of a number of friendly foreign nations as well as the Soviet Union and Japan. Such a position by the United States would lead to disputes between our government and member governments of the Northwest Atlantic Fisheries Convention. In the New England and mid-Atlantic coastal areas, one can foresee a good deal of difficulty and continuing conflict between the United States and those foreign nations who have traditionally fished off the United States Atlantic coast.

CONCLUSION

The enormous task of renegotiating some 28 conventions and agreements among more than 20 nations fishing within the 200-mile coast of the United States points up the need for a flexible position by the United States in the implementation of the Fishery Management and Conservation Act of 1976. In the absence of such flexibility, one can predict severe conflicts and disputes that could well affect other areas of our relations with countries whose fishermen fish within the 200-mile zone off the coast of the United States.

However, with time, patience, and perseverence, it seems quite likely that the United States will have the opportunity to greatly improve the conservation of fishery resources found in waters off its coast and to improve the economic status of its domestic fishing industry.

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[14]Since this section was written, agreement has been reached with Poland and Korea on the GIFA's.

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At the same time, it seems clear that there will be, for some time to come, the opportunity for foreign fishermen to continue to catch substantial quantities of fish within the 200-mile zone of the United States.

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APPENDIX A

I. International Regulatory Fishery Agreements to which the United States is Party

A. International Whaling Convention

B. Interim Convention on the Conservation of North Pacific Fur Seals

C. Inter-American Tropical Tuna Convention

D. International Convention for the Conservation of Atlantic Tunas

E. International Convention for the Northwest Atlantic Fisheries

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G. International Pacific Halibut Convention

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II. Bilateral Regulatory Fishery Agreements to which the United States is Party

A. United States - Brazil Agreement Concerning Shrimp

B. United States - Canadian Agreement on Reciprocal Fishing Privileges in Certain Areas Off the Coasts of the United States and Canada

C. United States - Japan Agreement Concerning Certain Fisheries Off the Coast of the United States

1. Agreement Concerning Salmon Fishing

2. Note of the Government of Japan Concerning Dragnet and Longline Fishing in Certain Waters

D. United States - Japan Agreement Concerning King and Tanner Crab Fisheries in the Eastern Bering Sea

E. United States - Korean Agreement Concerning Cooperation in Fisheries

F. United States - Polish Agreement Regarding Fisheries in the Northeastern Pacific Ocean Off the Coast of the United States

G. United States - Polish Agreement Regarding Fisheries in the Western Region of the Middle Atlantic Ocean

H. United States - U.S.S.R. Agreement on Certain Fishing Problems on the High Seas in the Western Areas of the Middle Atlantic Ocean

APPENDIX VI

I. United States - U.S.S.R. Agreement Regarding Fisheries in the Northeastern Pacific Ocean Off the Coast of the United States of America

J. United States - U.S.S.R. Agreement Relating to Fishing for King and Tanner Crab

I. International Regulatory Fishery Agreements to Which the United States is Party

A. International Whaling Convention

Prior to World War II, it was generally recognized by the international community that several species of whales were in danger of being overfished. However, numerous efforts to reach agreements for the protection of whale species either failed or resulted in ineffective agreements. Not until December 2, 1946 was agreement on a total catch limit for Antarctic pelagic whaling achieved through the International Convention for the Regulation of Whaling. This agreement was based on a seasonal limit of 16,000 BWU's (blue whale units) for all waters south of 40° South Latitude and established an International Whaling Commission as regulatory authority.

The Commission consists of one representative per country. It has no scientific personnel and only a part-time administrative staff. World whaling statistics are compiled under the auspices of the Bureau of International Whaling Statistics located in Norway.

Since the 1946 agreement, the convention has undergone several revisions and amendments, most recently during the period 1972-1975. And, in addition, membership has undergone substantial change. Present adherents to the International Whaling Convention (as of 1975) include: Argentina, Australia, Brazil, Canada, Denmark, France, Iceland, Japan, Mauritius, Norway, Panama, South Africa, the Union of Soviet Socialist Republics, the United Kingdom, and the United States. However, despite the convention revisions and the modifications in membership, the basic responsibilities of the International Whaling Commission have remained the same:

Article IV

1. The Commission may either in collaboration with or through independent agencies of the Contracting Governments or other public or private agencies, establishments or organizations, or independently

(a) encourage, recommend, or if necessary, organize studies and investigations relating to whales and whaling;

(b) collect and analyze statistical information concerning the current condition and trend of whale stocks, and the effects of whaling activities thereon;

(c) study, appraise, and disseminate information concerning methods of maintaining and increasing the populations of whale stocks.

2. ...

Article V

1. The Commission may amend from time to time the provisions of the Schedule by adopting regulations with respect to the

conservation and utilization of whale resources, fixing (a) protected and unprotected species; (b) open and closed seasons; (c) open and closed waters, including the designation of sanctuary areas; (d) size limits for each species; (e) time, methods and intensity of whaling (including the maximum catch of whales to be taken in any one season); (f) types and specifications of gear and apparatus and appliances which may be used; (g) methods of measurement; and (h) catch returns and other statistical and biological records.

Concern over whale stocks, particularly those in the North Pacific, led to a broadening of the scope of the International Whaling Commission; the failure of the quota system in the Antarctic during the 1950's having resulted in stock depletion and an increase in effort levels in the North Pacific. Despite the abandonment of the artificial BWU's as the basis for regulation and the adoption of quotas for individual species in 1966, the pattern of excessive overfishing in the North Pacific prevailed. This resulted in the U.S. Department of the Interior invoking the Endangered Species Conservation Act of 1969 with the designation of eight species of whales as "endangered." In so doing, it thereupon became illegal to import into the United States products manufactured from these species. Since the United States was a significant importer of the world's whale products, the ban had a measurable impact on Japan. This pressure from the United States, and the passage in 1972 of a ten-year moratorium on the hunting of whales at the United Nations Conference on the Human Environment at Stockholm, as well as the increased public concern over whale conservation, led in succeeding years to reduced quotas and the establishment of an International Observer System.

In addition, at the 27th meeting of the IWC in June 1975, agreement was reached on the imposition of a selective moratorium, giving automatic protection to any stock of whales which falls below a designated level of abundance. And lastly, the decision to impose quotas by stocks, according to geographic area, rather than globally by species, was generally accepted. The remaining problem of allocation of catch (global quotas are established and national shares determined after Commission meetings) is yet to be resolved.

Despite the fact that whaling is no longer an active industry in the United States (only Alaskan natives are engaged in whaling for the purpose of subsistence or creating articles of native handicraft), the United States has continually indicated its concern with the problem of whale conservation through its participation in the International Whaling Commission and the passage of such legislation as the Marine Mammal Protection Act of 1972. The latter will be amended by the Fishery Conservation and Management Act of 1976 (FCMA) so that Section 3 (15) of the Marine Mammal Protection Act of 1972 will read:

(15) The term "water under the jurisdiction of the United States" means --

(A) the territorial sea of the United States, and
(B) the waters included within a zone, contiguous to the territorial sea of the United States, of which the inner boundary is a line coterminous with the seaward boundary of each coastal state, and the outer boundary is a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured.

By this amendment, the United States will bring under its jurisdiction for the purpose of whale conservation and management, a substantial area of ocean territory in the North Pacific where previously countries such as Japan and the U.S.S.R. fished freely. In this area, on March 1, 1977 (effective date of FCMA), Section 101 of the Marine Mammal Protection Act (i.e., "There shall be a moratorium on the taking and importation of marine mammals and marine mammal products....") will apply. The area of jurisdiction in the North Pacific of the International Whaling Commission will be substantially cut back and it is highly probable that efforts to negotiate bilateral agreements for the taking of whales within the 200 mile zone will result.

B. Interim Convention on the Conservation of North Pacific Fur Seals

Canada, Japan, the United States of America and the Union of Soviet Socialist Republics, originally negotiated this agreement for a period of six years. However, it was extended in 1963 and 1969; the last time for a period of eighteen years. An attempt at renegotiation, initiated by the United States, in order to bring the convention into correspondence with the U.S. Marine Mammal Protection Act of 1972 was made in December 1975. Agreement was reached on a Draft Protocol Amending the Interim Convention on Conservation of North Pacific Fur Seals at that time. However, the Protocol has yet to be ratified approved by the Party Governments.

The 1957 Convention: 1) prohibits pelagic sealing (Article III); 2) gives the United States and the Soviet Union sole responsibility for regulation of herds on islands under their jurisdiction (Articles II, IV); and 3) provides Canada and Japan with compensation for their losses as a result of the ban on pelagic sealing (Article IX). (The United States and U.S.S.R. must give 15 percent of the fur skins each takes to Japan and 15 percent to Canada). In addition, the North Pacific Fur Seal Commission was established (Article V) for the purpose of coordinating research programs, determining limits of pelagic sealing for research purposes, and, as a result of the October 8, 1963 Protocol Amending the Interim Convention, exploring the possibility of whether a return to pelagic sealing should be allowed. Each member state participating in the Commission has one vote.

Albert W. Koers in International Regulation of Marine Fisheries: A Study of Regional Fisheries Organizations indicates that the overwhelming success of this international organization has been due largely to two unique characteristics of the situation:

First of all, fur seal operations no longer involve private entrepreneurs, but are carried out by government agencies. This greatly facilitates their regulation. Secondly, although there are no formal barriers to entry, no new States have attempted to enter the fur seal business in the Northeast Pacific, primarily because of its modest financial and economic value.

The absence of new entrants is probably the most important factor in the continued viability of the fur seal arrangements.[1]

Since the 1957 Convention prohibits all pelagic sealing, the Fishery Conservation and Management Act of 1976, extending the United States jurisdiction over fisheries to 200 miles, will have little substantive effect on the Interim Convention. The same may be said for the Draft Protocol which sustains the ban on pelagic sealing.

C. Inter-American Tropical Tuna Convention

The Inter-American Tropical Tuna Commission was established by a convention (originally between the United States and Costa Rica) signed on May 31, 1949 and which entered into force in March 1950. At the present time there are 8 members of the Inter-American Tropical Tuna Commission: Canada, Costa Rica, France, Japan, Mexico, Nicaragua, Panama and the United States. (However, in 1974 vessels of 13 nations: Bermuda, Canada, Colombia, Costa Rica, Ecuador, France, Japan, Mexico, The Netherlands Antilles, Panama, Peru, Spain, and the United States fished for tuna in the Eastern Pacific Ocean.) Each member nation has 1 vote and decisions of the Commission require a positive vote from all members.

The primary function of the IATTC is investigative; the purpose of the Commission being to inquire into the condition of yellowfin (Neothunnus) and skipjack (Katsuwonus) tuna and to recommend joint conservation measures to be implemented in order to effectively manage these species around maximum sustainable yield. In order to fulfill this task, the Commission employs its own scientific staff. (The management function of the IATTC is not explicitly stated in the 1949 Convention. However, since 1967, the IATTC has engaged in the setting of overall quotas for the optimum harvest of yellowfin tuna.)

The future of the IATTC depends on its solution of a number of problems, including one which bears directly on the United States extension of jurisdiction to 200 miles. First, the Commission suffers from a lack of funds. This financial constraint directly impinges on the amount of ocean research that the Commission may carry on during each fiscal year.

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[1]Albert W. Koers, International Regulation of Marine Fisheries: A Study of Regional Fisheries Organizations (London: Fishing News Books, 1973), pp. 86-87.

APPENDIX VI

Second, as overall quotas have become smaller and smaller, the season for yellowfin has become shorter and shorter. The result has been that the technology-deficient fishing industries of some member states suffered as they have beer unable to harvest their "fair" share of tuna in the face of technologically advanced industries (such as as those from the United States).

Third, over the past several years the IATTC has argued for expanding the harvest of skipjack tuna while pressing for further conservation measures with regard to yellowfin. The difficulty here revolves around the fact that the two species mix in schools to the extent that the incidental catch of yellowfin, the regulated species, is substantial after the close of the yellowfin fishing season.

Fourth, tuna are a highly migratory species and travel over long distances. It has been suggested that the IATTC's area of competence is not large enough and that perhaps a global institution should be established in order to deal more effectively with the management problem.

Fifth, more nation-states are currently engaged in the fishing of tuna in the area than are presently a party to the Convention. Effective management cannot be achieved while some nations remain outside the purview of Convention jurisdiction.

Sixth, in an exchange of notes on March 3, 1950 for the purpose of clarification of the treaty, Costa Rica and the United States agreed that "notwithstanding the specific powers conferred upon the Commission, nothing in the Convention shall be interpreted as a relinquishment of or a limitation upon the Sovereignty of a High Contracting Party over waters under its jurisdiction." No attempt, however, is made to define the "waters under its jurisdiction" nor the area of jurisdiction for waters within the Convention's purview. With the extension of fishery jurisdiction to 200 miles of a number of coastal states off whose coast tuna are caught, a number of areas originally open to foreign fishing fleets will be closed. This, along with the lack of clarity in the definition of waters of jurisdiction, will necessitate renegotiation of this treaty.

The 1974 Annual Report of the Commission states that, "During 1974 vessels of 13 nations (Bermuda, Canada, Colombia, Costa Rica, Ecuador, France, Japan, Mexico, The Netherlands Antilles, Panama, Peru, Spain, and the United States) fished for tunas in the Eastern Pacific Ocean. These vessels captured primarily yellowfin and skipjack tuna, along with small quantities of other tunas. The three primary types of gear used to make the catches, in order of importance, were purse seine, pole and line, and longline.

Because of heavy exploitation, the yellowfin tuna fishery has been under international management since 1966, but it has not been demonstrated that there is a need to implement conservation measures of skipjack tuna or other species of tuna taken in the Eastern Pacific fishery. The area in which the yellowfin conservation program applies is referred to as the Commission's Yellowfin Regulatory Area (CYRA).

From 1965 through 1973 the aggregate capacity of the international fleet fishing for tuna in the CYRA increased from about 47,000 to 138,000 tons, and by the end of 1974 this had increased to 153,000 tons. During 1974 this fleet captured 189,450 tons of yellowfin and 84,000 tons of skipjack from the CYRA. The catch of yellowfin was the largest taken from the CYRA in the history of the fishery. The 1974 skipjack catch was about 36,700 tons greater than that of 1973, and nearly 17,000 tons above the average catch during the previous five years. In addition to the catch from the CYRA, purse-seine vessels fishing west of the CYRA and east of 150° West Longitude caught 41,700 tons of yellowfin, 2,850 tons of skipjack, and 20 tons of skipjack and 831 tons of bigeye.[2]

The Commission staff is of the view that the yellowfin tuna stock is probably capable of producing about 150,000 tons a year on a sustainable basis on the average. However, the high catches during the past few years plus other circumstantial evidence indicate that some overfishing of the yellowfin tuna stock has recently occurred. Nevertheless, the record of this international commission is very good indeed. Without the controls placed on the fishing for yellowfin tuna unquestionably the stock would have been depleted. The economic consequences of such depletion would have been horrendous.

Skipjack tuna, the other major tuna species caught in the Eastern tropical Pacific Ocean, occurs in nearly all the tropical waters of the world's oceans. In recent years the world catch of this species has exceeded that of any other tuna or tuna-like species. This is also the case for the Pacific Ocean: in 1972, skipjack comprised 40 percent of the catch of the principal market species of tunas in that ocean.

The scientific and management work of the Inter-American Tropical Tuna Commission has been exemplary and very successful. It has, nevertheless, been plagued by political problems almost from its start. Comprised of nations with a high degree of technology, such as the United States, Canada and Japan on the one hand, and developing nations such as Mexico, Panama, and Costa Rica on the other, arguments in the Commission revolve around developing country concern over preponderance of the large United States fleet and its correspondingly large catch. Mexico has succeeded in getting special allocation for its fleet, and this has helped to increase its proportionate take of yellowfin to the present level of about 10 percent (Table 1).

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[2]Inter-American Tropical Tuna Commission. Annual Report--1974. La Jolla, California: Scripps Institution of Oceanography, 1975. pp. 24-25.

APPENDIX VI

Table 1

Catches of yellowfin and skipjack from CYRA by flag of vessel, in terms of percent of the total catch, 1974[1]

Flag	Yellowfin	Skipjack
	%	%
Canada	4.7	5.6
Ecuador	5.2	10.0
Japan	0.5	0.4
Mexico	9.3	5.0
Panama	4.3	5.5
U.I.A.	68.0	60.3
Bermuda, Costa Rica, France, Netherlands Antilles, and Spain	7.1	12.0

[1] Ibid., pp. 25-26.

D. International Convention for the Conservation of Atlantic Tunas

After World War II there was a large increase in fishing for tuna in the Atlantic Ocean. More than 20 nations fish Atlantic tuna stocks and by 1960 many countries feared that some species and stocks of Atlantic tunas were being overfished. As a result in 1966 a Convention was signed and ratified by a number of nations. Present parties to the Convention include: Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Republic of Korea, Morocco, Portugal, Senegal, South Africa, Spain, and the United States.

The Commission has set up panels to study the populations of tuna and tuna-like species (Article IV).

In addition, under Article VIII:

"(a) The Commission may, on the basis of scientific evidence make recommendations designed to maintain the populations of tuna and tuna-like fishes that may be taken in the Convention area at levels which will permit the maximum sustainable catch."

However, the application of these recommendations are not applicable to those parties indicating objections or reservations.

With regard to our new Fishery Conservation and Management Act of 1976, the following articles of the Convention are relevant:

"Article I

The area to which this Convention shall apply, hereinafter referred to as the 'Convention area,' shall be all waters of the Atlantic Ocean, including the adjacent Seas.

Article II

Nothing in this Convention shall be considered as affecting the rights, claims or views of any Contracting Party in regard to the limits of territorial waters or the extent of jurisdiction over fisheries under international law."

Since Article I does not specifically define the term "Convention area," sanction of unilateral United States extension of fishery jurisdiction is explicit in Article II. However, a number of nations that are party to this treaty have Atlantic coasts, and have or are in the process of extending their own jurisdiction over fisheries. It is likely that, despite the fact that the ICCAT has no direct management functions per se, conflicts will result over the research function of the Commission.

Within the Convention area, the yellowfin tuna catch has increased from 69,000 M.T. in 1964 to about 100,000 M.T. in 1974 and 1975. According to the preliminary scientific evidence available, the maximum

sustainable catch from the resource is probably somewhat less than 100,000 M.T., and thus it is likely that some slight overfishing of the yellowfin tuna stocks of the Atlantic Ocean is now occurring.

Although varying significantly, the catch of skipjack has increased substantially from 1964 to a high in 1974 of 113,000 M.T. Scientists working with the Commission believe that substantially more skipjack could be taken from this fishery.

Bluefin tuna, a species of the more temperate zone, has significantly declined in catch from 1964 through 1974, from about 38,000 M.T. to about 16,000 M.T. In response to reduced catches of bluefin tuna in the Atlantic, recommendations by ICNAF made in 1974, resulted in regulations being applied in several fisheries for bluefins. As a result, the catch level in 1975 is below that which otherwise would have been reached. It is the consensus that the current levels of fishing mortality for this species in the Atlantic are very high for such a potentially long-lived fish. The strong implication is that reduced fishing would improve the yield from the bluefin tuna stock.

The albacore tuna catches in the North Atlantic Ocean, which also come under the purview of this Commission, have declined slightly from 1964 to 1974. Incomplete scientific evidence indicates that the stock north of the equator is approaching its optimum level of exploitation.

With respect to the southern stock of albacore (i.e., south of the equator), it would appear from the relatively incomplete scientific data that have been collected, that this stock is relatively more heavily exploited than the North Atlantic longline fishery for the same species. Further increases in effort will very likely cause a decrease in the sustainable yield. Thus, with respect to albacore tuna in the Atlantic Ocean, it appears that the fishery has expanded to its upper limit and that increased effort will probably bring about a reduced return at a considerably higher cost.

Several other species of tuna are taken in the Atlantic, the major one being the bigeye tuna. The catch of this species has about doubled from 1964 through 1974. Preliminary scientific data indicate that the catch of bigeye tuna in the Atlantic probably can be expanded by a small amount, but that the stock is being fished to close to its maximum level of productivity.

Other tuna species (i.e., large bill fishes: marlins and sword fishes) incidental to the tunas taken by the longline fleet, are also fished in the Atlantic. The data from Commission records appear to be incomplete with respect to the effects of fishing on these species. A committee has been set up to study the status of the stocks of smaller tunas.

E. International Convention for the Northwest Atlantic Fisheries

The Commission, established by the International Convention for the Northwest Atlantic Fisheries is composed of the following member nations: Bulgaria, Canada, Denmark, France, the German Democratic Republic, the Federal Republic of Germany, Iceland, Italy, Japan, Norway, Poland, Portugal, Romania, Spain, the Union of Soviet Socialist Republics, the United Kingdom and the United States. Implementation of the Convention by the United States resulted with the passage of the Northwest Atlantic Fisheries Act of 1950 in July of the same year. The Convention has been frequently amended in succeeding years.

The Convention area is divided into six sub-areas and the sum of these encompasses the ocean area off the eastern coast of the North American continent from the middle Atlantic States of the United States to the Davis Straits. Within this area the Commission concerns itself primarily with: 1) joint scientific and research activities; 2) analysis of the statistical data relating to all the living marine resources found in the area; and 3) recommendation of joint regulatory action in order to permit harvesting of fishery resources around maximum sustainable yield. Special jurisdiction over hood and harp seals, within the convention area, is vested in a panel established in 1966.[3] Enforcement is provided through an inspection scheme which allows for boarding of vessels suspected of violating ICNAF regulations.

Prior to 1969, the Commission's regulatory program had been limited almost exclusively to instituting trawl mesh regulations. However the great expansion of fishing effort in the Northwest Atlantic made it evident that new regulatory approaches specifically designed to limit fishing intensity were necessary. The Commission at its 1969 annual meeting approved overall haddock quotas which entered into force in 1970. In 1970 at its annual meeting, the Commission approved quotas for yellowtail flounder stocks off New England and took action to limit fishing for Atlantic salmon on the high seas.

Under an amendment to the Convention ratified December 15, 1971, the Commission received greater flexibility in the types of regulations it could propose. The more general authority granted under the Protocol provided the basis for the management of fisheries involved by dividing the overall quota into national shares. Those quotas were initially applied to the herring fishery at a special meeting in February 1972. They have subsequently been approved for most of the major commercially exploited finfish stocks in the convention area.

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[3]Michael J. Jacobs, "United States Participation in International Fisheries Agreements," Journal of Maritime Law and Commerce, Vol. 6, No. 4, p. 480.

Further dramatic progress occurred at the October 1973 meeting with regard to quotas. In June of that year, the ICNAF scheme had nearly broken down when the United States insisted that national quotas be imposed which would result in significant reductions for all of the participating nations other than ourselves and Canada, who would have been entitled to moderate increases in catch. Faced with the refusal of the Commission to adopt the quotas proposed by the United States, there were threats of the withdrawal of the United States from ICNAF. That, combined with the growing momentum in the Congress, carefully monitored by ICNAF participants, for a 200-mile fisheries jurisdiction, resulted in adoption of our proposal. In October 1973 sizeable cuts were taken by non-North American participants. For example the U.S.S.R. agreed to a reduction in catch from 490 thousand tons in 1973 to 342.5 thousand tons in 1974, while our catch in 1973 of 191.3 thousand tons was increased to 195 thousand tons.[4]

Reliance on the species quota regulatory system instituted in 1969 has not proved adequate for the effective management of the resources contained in the convention area:

There is a belief that the fishing capabilities now deployed in the convention area are out of proportion to the available resources, and that there are far more vessels present in those fisheries than are needed to maximize harvests. The pressure of this large and highly mobile fishing capacity poses a threat not only to the particular species being fished at the time, but to the long-term stability of the entire biomass of fish in the convention area. Without overall effort limitation, proposed by the United States in 1972 and under study in ICNAF, or other, more effective conservation vehicles, excess fishing could merely shift from one species to another, depleting each in turn. It is possible that some stocks in those fisheries can be depleted within one or two seasons of concentrated fishing. For ecologically inter-related stocks, this poses the possibility of a domino effect being set into motion. The incidental catch of depleted stocks will further retard the prospect of their recovery.[5]

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[4]Ibid., p. 481.

[5]Ibid., p. 482-483.

F. International North Pacific Fisheries Convention

The International North Pacific Fisheries Commission came into being as a result of the International Convention for the High Seas Fisheries of the North Pacific Ocean (with annex and protocol) signed on May 9, 1952. Parties to this convention include: Canada, Japan, and the United States, though more nations than these three now participate in the North Pacific fisheries.

The scope of the INPFC is comprehensive within the region of the North Pacific. Its goal is "to promote and coordinate the scientific studies necessary to ascertain the conservation measures required to secure the maximum sustained productivity of fisheries of joint interest to the Contracting Parties and to recommend such measures to such Parties...." (Preamble, International Convention for the High Seas Fisheries of the North Pacific Ocean). In meeting this management challenge, the Commission undertakes three critical functions. First, the Commission administers those provisions in the 1952 Convention dealing with abstentions. As a result of these provisions (contained in the annex and protocol of the treaty), Japan originally agreed not to fish various species of halibut and herring of North American origin, where Canada and the United States were engaged in commercial harvest of the stocks (removed from abstention in 1963), and salmon originating in the rivers and streams of North America. With regard to the latter species, the Japanese high seas salmon fishery has been contained in an area west of the abstention line of 175° West Longitude in the Bering Sea and the North Pacific. No Japanese fishing vessels are permitted to fish for salmon east of this line.

The abstention principle also has particular relevance for the Canadian government and their fishing industry. Via this Convention, Canada agreed to refrain from fishing for salmon originating in United States streams and rivers of Bristol Bay, Alaska.

The second function of the INPFC is to investigate the condition of stocks not subject to conservation measures, but currently exploited by at least two parties to the Convention for the purpose of determining whether or not there is a need for joint conservation measures (Article III (1) (c)). Halibut was the first species to come within the competence of this article. Joint conservation measures were instituted in 1963, when certain halibut stocks were removed from abstention.

The third function of the Commission is outlined in the Protocol to the Convention. In this section, the INPFC is authorized to examine the provisional line of 175° West Longitude for the purpose of readjustment if it is determined that another line more accurately reflects the division of salmon of American origin from those of Asian origin.

The 1952 Convention expired in 1962 and has since been extended on a year by year basis. The Commission, as a result of this Convention, is structured around three national sections, each of which has one vote.

The rule of unanimity applies with regard to all decisions, recommendations and resolutions (Article II).

The passage of the Fishery Conservation and Management Act of 1976 will have some significant impacts on the International Convention for the High Seas Fisheries of the North Pacific Ocean, since the national extension of jurisdiction will obviate existing Convention regulations. On March 1, 1977 when the United States extends its fishery jurisdiction to 200 miles for the purpose of effective management and conservation, the United States will have jurisdiction over living resources west of 175° West Longitude (an area now reserved for Japanese fishery interests). The abstention principle contained in the International North Pacific Fisheries Convention will be negated as a result of the implementation of FCMA. Renegotiation of the Convention is, therefore, to be expected.

In light of the current Law of the Sea negotiations, along with Article 6 (1) of the 1958 Convention on Fishing and Conservation of the Living Resources of the High Seas, the United States negotiating position will be formulated around the recognized special interest of coastal states in maintaining the productivity of living resources in the high seas adjacent to the territorial sea. The Japanese negotiating position will probably be formulated around recognition of historic fishing rights. On the basis of these disparate positions renegotiation will be a lengthy and time-consuming process.

G. International Pacific Halibut Convention

The Convention for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea (March 2, 1953) established the International Pacific Halibut Commission in order to provide for more effective preservation of stocks of halibut. Unlike most international fisheries treaties, this convention is bilateral in nature; Canada and the United States being the only signatories.

The Commission's primary functions are investigative and regulatory for the purpose of managing the fishery around maximum sustainable yield. Therefore, the Commission is authorized to:

Article III(2)

(a) divide the Convention waters into areas;

(b) establish one or more closed seasons as to each area;

(c) limit the size of the fish and the quantity of the catch to be taken from each area within any season during which fishing is allowed;

(d) during both open and closed seasons, permit, limit, regulate or prohibit, the incidental catch of halibut that may be taken, retained, possessed, or landed from each area or portion of an area, by vessels fishing for other species of fish;

(e) prohibit departure of vessels from any port or place, or from any receiving vessel or station, to any area for halibut fishing, after any date when in the judgment of the International Pacific Halibut Commission the vessels which have departed for that area, prior to that date or which are known to be fishing in that area shall suffice to catch the limit which shall have been set for that area under section (c) of this paragraph;

(f) fix the size and character of halibut fishing appliances to be used in any area;

(g) make such regulations for the licensing and departure of vessels and for the collection of statistics of the catch of halibut as it shall find necessary to determine the condition and trend of the halibut fishery and to carry out the other provisions of this Convention;

(h) close to all taking of halibut such portion or portions of an area or areas as the International Pacific Halibut Commission finds to be populated by small, immature halibut and designates as nursery grounds.

In order to successfully undertake these tasks, the commission has its own independent staff. The Commission itself is composed of six representatives, three from each country. Decisions are reached with the concurrence of at least two commissioners from both the United States and Canada.

Articles which are likely to be affected by the implementation of the Fishery Conservation and Management Act of 1976 are the first two of the Convention for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and the Bering Sea. (These articles deal with the waters outside of the territorial seas of both nations.) However, since both parties to the treaty have a long tradition of close cooperation, and since there is broad-based support for the task of rebuilding the halibut fishery from all sectors involved, it is unlikely that any serious controversy will occur as a result of renegotiation.

However, because both Canada and the United States intend to enforce a 200-mile fishery zone on January 1 and March 1, respectively, in 1977, reciprocal fishing rights of some sort will need to be negotiated between the United States and Canada.

H. International Pacific Salmon Fisheries Convention

The International Pacific Salmon Fisheries Commission was brought into existence by the Convention for the Protection, Preservation, and Extension of the Sockeye Salmon Fishery of the Fraser River System of May 26, 1930. (This agreement between the United States and Canada was

APPENDIX VI

later amended by a protocol to include pink salmon on December 28, 1956.) The Commission is composed of three representatives from each country. Decisions are made by majority vote; the only stipulation being that two members of each delegation must concur. The Commission has its own scientific research staff.

The IPSFC was an initial response to the loss in productivity of the Fraser River salmon fishery after 1913, when salmon failed to return to the river in sufficient number. By 1944, it had been determined that the loss of productivity was due to a rock slide occurring as a result of railroad construction. A remedy to the situation was agreed upon via an exchange of notes on July 21 and August 5, 1944. Since 1944, the Commission has engaged in development of proposals for the purpose of regulation, specifically with regard to: 1) ensuring adequate escapement to spawning grounds and 2) dividing the catch allowable between fishermen in the United States and Canada.

The following articles are likely to be affected by the extension of fisheries jurisdiction to 200 miles: Article I (which indicates the waters dealt with by the treaty); Articles IV and V (dealing with gear and other fishing regulations on the high seas); and Articles VIII and IX (dealing with enforcement on the high seas).

II. Bilateral Regulatory Fishery Agreements to Which the United States is Party

A. U.S. - Brazil Agreement Concerning Shrimp

The United States - Brazil Agreement Concerning Shrimp, signed on May 9, 1972, and since extended, defines the "area of agreement" as "the waters off the coast of Brazil having the isobath of thirty (30) meters as the southwest limit and the latitude 1° north as the southern limit and 47° 30' west longitude as an eastern limit." (Article I). This area falls within the 200 nautical mile zone off the coast of Brazil claimed by that country's government as its territorial sea. In a brief statement preceding the text of the agreement Brazil states:

> that it considers its territorial sea to extend to a distance of 200 nautical miles from Brazil's coast, that the exploration of crustaceans and other living resources, which are closely dependent on the seabed under the Brazilian territorial sea, is reserved to Brazilian fishing vessels, and that exception to this provision can only be granted through international agreements.

In a similar declaration preceding the agreement, the United States indicates:

> that it does not consider itself obligated under international law to recognize territorial claims of more than 3 nautical miles nor fisheries jurisdiction of more than twelve nautical miles, beyond which zone of jurisdiction all nations have the right to fish freely, and that it does not consider that all crustaceans are living organisms belonging to sedentary species as defined in the 1958 Convention on the Continental Shelf....

Regulation of the shrimp industry is primarily for conservation purposes. Under Annex I, Brazil agrees to institute the following measures:

a) Prohibition of shrimp fishing activities, for conservation purposes, in spawning and breeding areas;
b) Prohibition of the use of chemical, toxic or explosive substances in or near fishing areas;
c) Registry of all fishing vessels with the Maritime Port Authority (Capitania dos Portos) and with SUDEPE; [6]
d) Payment of fees and taxes for periodical inspections;
e) Use of the SUDEPE fishing logs to be returned after each trip or weekly;

[6] SUDEPE is the acronym for the Superintendencia do Desenvolvimento da Pesca of the Ministry of Agriculture.

f) Prohibition of the use of fishing gear and of other equipment considered by SUDEPE to have destructive effects on stocks;
g) Prohibition of discharging oil and organic waste.

Under Annex II, the United States agreed to take the following measures in the area defined:

a) Not more than 325 vessels flying the United States flag shall fish for shrimp in the area of agreement and the United States Government undertakes to maintain a presence of not more than 160 of those vessels in the area at any one time. Such vessels shall be of the same type and have the same gear as those commonly employed in this fishery in the past, noting that electric equipment for fishing purposes has not been commonly employed by boats in this fishery in the past.

b) Shrimp fishing in the area of agreement shall be limited to the period from March 1 to November 30.

c) Shrimp fishing in that part of the area of agreement southeast of a bearing of 240° from Ponta do Ceu radio-beacon shall be limited to the period March 1 to July 1.

d) Transshipment of catch may be made only between vessels authorized under this Agreement to fish in the area of agreement.

Since this agreement deals only with the waters off the Brazilian coast, the passage of the Fishery Conservation and Management Act is likely to have a minimal impact, especially since the United States has already "noted" the much wider jurisdiction of Brazil.

B. U.S. - Canadian Agreement on Reciprocal Fishing Privileges in Certain Areas Off the Coasts of the United States and Canada

In renegotiating the Reciprocal Fishing Privileges Agreement in 1973, primary emphasis was placed on the origin of the anadromous stock as a basis for determination of a state's jurisdiction over the right to fish. The 1973 agreement contained the following provisions:

1. Canadian salmon fishing in the U.S. contiguous fishery zone south of Carroll Island at 48° 3' North Latitude off the coast of Washington was prohibited.

2. U.S. salmon fishing effort in the contiguous zone off most of Vancouver Island was eliminated. Sport fishing by U.S. nationals is not affected if they comply with Canadian regulations.

3. Consultations to regulate fisheries in the Strait of Juan de Fuca and Northern Puget Sound are to be held as necessary.

4. U.S. fishing days for king (chinook) salmon and dog (chum) salmon near Point Roberts are to be coordinated with Canadian seasons for the lower Fraser River.

5. Limited blackcod fishing is permitted for each country in the Pacific reciprocal areas.

6. A limited tuna catch by Canada is permitted off the U.S. Atlantic coast in the reciprocal area.

7. Large U.S. trawlers are not permitted where comparable Canadian trawlers are prohibited off the Atlantic Coast of Canada.[7]

Point (7) of the Reciprocal Fishing Privileges Agreement states:

(7) Nothing in this Agreement shall prejudice the claims or views of either of the parties concerning internal waters, territorial waters, or jurisdiction over fisheries or the resources of the continental shelf; further, nothing in this Agreement shall affect either bilateral or multilateral agreements to which either Government is party.

This point explicitly recognizes that the jurisdictional limits set in the Fishery Conservation and Management Act of 1976 will take precedence over those set in the Reciprocal Fishing Privileges Agreement. The latter agreement would therefore have to be renegotiated under Section 201. Foreign Fishing of FCMA.

C. U.S.-Japan Agreement Concerning Certain Fisheries Off the Coast of the United States

According to this agreement, effected by an exchange of notes, Japan agreed to:

take necessary measures to ensure that the nationals and vessels of Japan will not engage in fishing...in the waters which are contiguous to the territorial sea of the United States of America and extend to a limit of twelve nautical miles from the baseline from which the United States territorial sea is measured.

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[7]U.S. National Oceanic and Atmospheric Administration, NOAA Press Release 73-144 (Washington, D.C.: U.S. Dept. of Commerce, July 3, 1973), no page.

Areas for loading operations are subject to the same limitations. Specific areas of exception are carefully detailed. And in addition, Japan is forbidden to fish for tuna, except in specifically designated areas. The imposition of a 200 mile fishery resource jurisdiction zone will necessitate the renegotiation of the understanding formerly determined by a limit of 12 nautical miles.

1. Agreement Concerning Salmon Fishing

Via an exchange of notes, both parties agreed to accept the provisional abstention lines specified by the International Convention for the High Seas Fisheries of the North Pacific Ocean. Any renegotiation of the latter Convention, brought about by the passage of the Fishery Conservation and Management Act will result in renegotiation of this agreement.

2. Note of the Government of Japan Concerning Dragnet and Longline Fishing in Certain Waters

Via this note, the Japanese government detailed areas and time periods in which it would not engage in dragnet and longline fishing. Many of these areas will fall within the extended jurisdiction of the United States and delimitation of areas will therefore need to be renegotiated.

D. U.S.-Japan Agreement Concerning the King and Tanner Crab Fisheries in the Eastern Bering Sea

The exchange of notes which brought about this Agreement recognized the historic right of Japan to fish for crab in this area. However, for the purpose of conserving these living resources, Japan agreed to ensure that (Point 3 (1)): "A. The fishing operations for king and tanner crabs by nationals and vessels of Japan for the years 1975 and 1976 will be conducted in the waters north of 55° 33' North Latitude and West of 164° West Longitude." Japan also agreed to limit the number of metric tons of crab within specific boundaries. This agreement, and the agreements that preceded it, constitute de facto recognition of the fact that the United States has exclusive exploitation rights to these resources.[8]

In addition, it should be noted that according to Article 2 (1) of the Convention on the Continental Shelf (4/29/58): "1. The coastal state exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources." And for the purpose of that Convention, natural resources are defined as consisting of (Article 2 (4)):

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[8]Walter B. Parker, Alaska and the Law of the Sea: International Fisheries Regimes of the North Pacific (Anchorage: University of Alaska - Arctic Environmental Information and Data Center, June 1974), p. 36.

the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.

The Fishery Conservation and Management Act's definition of the continental shelf fishery resources is consistent with the above. The effect of the implementation of FCMA will be to make illegal Japanese fishing operations for king and tanner crabs in the areas presently designated in the bilateral agreement.

E. U.S.-Korean Agreement Concerning Cooperation in Fisheries

Provisions of this agreement are summarized below:

"The United States agreed to provide technical advice on shellfish sanitation and salmon propagation to Korea. (Article II).

Three loading areas were established within the United States contiguous zone in the Bering Sea for Korean fishing boats to transfer their cargoes. (Article III).

Both nations agree to exchange scientific and statistical data and to assist in development of joint participation ventures in commercial fisheries. (Articles I, IV).

Korea agreed to refrain from fishing for salmon and halibut in the Northeastern Pacific Ocean and Bering Sea east of 175° west longitude... (Article V).

The two nations agreed to consult on and limit gear conflicts and to refrain from practices which would result in pollution of the sea.[9] (Articles VI, VII)."

On March 1, 1977, United States unilateral extension of jurisdiction over fishery resources will extend westward beyond the abstention line of 175° West Longitude. Renegotiation of this agreement will therefore be necessary if it is to continue in force.

F. U.S.-Polish Agreement Regarding Fisheries in the Northeastern Pacific Ocean Off the Coast of the United States

The United States - Polish Agreement Regarding Fisheries in the Northeastern Pacific Ocean is a first attempt to incorporate the principles evolving from the current Law of the Sea negotiations.

[9]Ibid., p. 47

Recognition is given to the special interest and preferential rights of coastal states. As a result, Poland accepts United States determination of total catch allowable for all species found off the Pacific coast and agrees to abide by a scheme by which that portion of the total allowable catch which the United States is unable to harvest is allocated among foreign fishermen.

Additional restraints and controls are placed on the Polish fishing fleet in the form of quotas (specifically for hake), licensing restrictions (a decline in the number of licenses; 15 to 12), and reduction of the number of fishing and processing vessels permitted off the United States coast (from 11 to 8). Poland also agrees to refrain from fishing the following stocks: Pacific salmon, halibut, rockfish, black cod, flounders, soles, Pacific mackerel, Pacific herring, and shrimp and other continental shelf resources.

New area and time restrictions call for Polish abstention from: 1) fishing year-round from 38° 30' North Latitude to the United States-Mexican border in order to protect rockfish and juvenile hake; and 2) fishing the area between 147° West and 157° West longitude for a nine-month period.

This agreement appears most consistent with the provisions of the Fishery Conservation and Management Act of 1976. Due to the foresight with which this agreement was negotiated, a minimum of renegotiation may be expected.

G. U.S.-Polish Agreement Regarding Fisheries in the Western Region of the Middle Atlantic Ocean

The purpose of this agreement, signed June 2, 1973, and since extended, is to: 1) arrange for exchange of scientific data and promote cooperation among fishery research institutions (Article 1); 2) initiate a system of closed seasons and closed areas in order to provide for the maintenance of fish stocks (Article 2 (1) (a and b)); 3) limit incidental catch of particular species (Article 2 (1) (c)); 4) prevent intentional and incidental catch of lobster by Polish fishing vessels (Article 2 (2) (a)); and 5) restrain Polish fishing vessels "from conducting specialized fisheries for yellowtail flounder and red hake off southern New England, bearing in mind the conservation regulations in effect pursuant to the International Convention for the Northwest Atlantic Fisheries" (Article 2 (2) (b)). The agreement also specifies in which areas and during what time Polish fishing vessels may conduct loading operations within the nine-mile contiguous fishing zone (Article 4), provides for entry into ports (Article 5), indicates possible arrangements for exchange of fisheries authorities (Article 6), and establishes a United States-Polish Fisheries Conciliation Board (Annex I).

The implementation of the Fishery Conservation and Management Act will require that this agreement undergo substantial renegotiation, since the area of competence currently specified in the agreement will fall within the 200-mile fishery conservation zone. Areas under the 1973 agreement which were open to Polish fishing vessels will be closed to these vessels after March 1, 1977. In addition, since much of this agreement depends on the enforcement capacity of the International Convention for the Northwest Atlantic Fisheries, successful renegotiation of the United States-Polish bilateral will be largely determined by the outcome of the renegotiation of ICNAF.

H. U.S.-U.S.S.R. Agreement on Certain Fishing Problems on the High Seas in the Western Areas of the Middle Atlantic Ocean

Under the terms of this agreement, since extended, both parties have agreed to: 1) arrange for the exchange of scientific data and promotion of cooperation among fishery research institutions (Point 1); 2) ensure maintenance of fish stocks by establishing a system of closed seasons and closed areas (Point 2); 3) limit the catch of scup, flounders, and black sea bass to 1967 levels in areas specified (Point 2 (b)); 4) limit catches of silver hake, red hake, flounder (other than yellowtail), sea herring and mackerel so that aggregate catches comply with ICNAF size limitations and do not exceed agreed upon ICNAF national allocations (Point 2 (e and f)); 5) prevent the U.S.S.R. from intentional and incidental fishing for lobster (Point 3); and 6) impose specific conservation measures for yellowtail flounder (Point 4).

The agreement also indicates in which areas and during what times Soviet fishing vessels may conduct loading operations within the nine-mile contiguous fishing zone (Point 6) and during what times and in what areas the U.S.S.R. will fish within the nine-mile fishery zone contiguous to the territorial sea of the United States (Point 7). Provisions for entry into ports (Point 8) are established and suggestions for possible arrangements for exchange of fisheries' representatives are made (Point 10). The 1949 International Convention for the Northwest Atlantic Fisheries Scheme of Joint Enforcement applies on a voluntary basis (Point 11).

With the implementation of the Fishery Conservation and Management Act of 1976, it will be necessary to renegotiate this agreement since the area specified will fall well within the 200-mile fishery conservation zone. Areas under the 1973 agreement which were open to Soviet fishing vessels will be closed to these vessels after March 1, 1977. In addition, since much of this agreement depends on the enforcement capacity of the International Commission for the Northwest Atlantic Fisheries, successful renegotiations of the United States-U.S.S.R. bilateral will be largely determined by the outcome of the renegotiation of ICNAF.

I. U.S.-U.S.S.R. Agreement Regarding Fisheries in the Northeastern Pacific Off the Coast of the United States of America

This agreement includes provisions for: 1) the exchange of scientific information and facilitation of entry into ports of research vessels of the other country when both are engaged in joint research projects (Point 1); 2) the implementation of national conservation measures, particularly with regard to the living resources of the continental shelf (Points 2 and 3); 3) the institution of measures to prevent gear conflicts (Points 4 and 5); 4) areas and time periods in which no fishing with mobile gear will be allowed off the coast of the United States (Point 6); 5) areas "within the seaward waters of the territorial waters of the United States extending to twelve nautical miles from the baseline from which the United States territorial sea is measured" in which the Soviet Union may engage in fishing and conduct loading operations (Point 8); 6) areas in which the Soviet Union will refrain from fishing (Point 10); 7) specific regulations with regard to halibut, trawling, entry into ports, and pollution (Points 10, 11, 13, and 14); and 8) catch limitations for species found in the eastern Bering Sea, the Gulf of Alaska, off the Aleutian Islands, off the coasts of Washington, Oregon, and California, and for Pacific hake (Point 12).

Renegotiation of this agreement will be necessary since many of the areas detailed will fall within the jurisdiction of the United States as of March 1, 1977.

J. U.S.-U.S.S.R. Agreement Relating to Fishing for King and Tanner Crab

Point 1 of this agreement gives recognition to Article 2 of the 1958 Convention on the Continental Shelf, which indicates that king and tanner crabs are natural resources of the continental shelf over which the coastal state exercises sovereign rights for the purposes of exploration and exploitation. Nevertheless, ensuing points authorize the Soviet Union to continue its crab fishery in the eastern Bering Sea subject to catch limitation in specific areas. In general, the Soviet Union is authorized to fish in "that portion of the southeastern Bering Sea lying seaward of twelve nautical miles from the baseline from which the United States territorial sea is measured west of 164° West Longitude and north of 55° 30' North Latitude" (Appendix Point 1). In addition, this agreement sets size limitations, regulates incidental catch, limits gear to crab pots, regulates Soviet catch of other species and authorizes exchange of scientific information and personnel between the two parties.

After March 1, 1977, the previously referred to area, will fall within the 200-mile zone claimed by the United States for the purposes of fishery management and conservation, necessitating renegotiation of this agreement.

APPENDIX B

I. Other Regional Fisheries Associations

A. FAO Regional Bodies in which the United States Participates[10]

1. Fishery Committee for the Eastern Central Atlantic (CECAF)

2. Indian Ocean Fishery Commission (IOFC)

3. Indo-Pacific Fisheries Council (IPFC)

4. Western Central Atlantic Fishing Commission (WECAFC)

B. FAO Regional Bodies in which the United States does not Participate[11]

1. Regional Fishery Advisory Commission for the Southwest Atlantic (CARPAS)

2. Committee for Inland Fisheries of Africa

3. European Inland Fisheries Advisory Commission (EIFAC)

4. General Fisheries Council for the Mediterranean (GFCM)

C. Non-FAO Regional Fisheries Arrangements[12]

1. Baltic Sea Salmon Standing Committee (BSSC)

2. International Baltic Sea Fishery Commission (IBSFC)

3. International Commission for the Southeast Atlantic Fisheries (ICSEAF)

4. Japan - Republic of Korea Joint Fisheries Commission (JKFC)

5. Japan - Soviet Northwest Pacific Fisheries Commission (JSFC)

6. Mixed Commission for Black Sea Fisheries (MCBSF)

7. Northeast Atlantic Fisheries Commission (NEAFC)

8. Permanent Commission of the Conference on the Use and Conservation of the Marine Resources of the South Pacific (PCSP)

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[10]Summaries included.

[11]Summaries not included.

[12]Summaries not included.

9. Sealing Commission for the Northeast Atlantic (SCNEA)
10. Sealing Commission for the Northwest Atlantic (SCNWA)
11. Shellfish Commission for the Skagerrak-Kattegat (SCSK)

I. Other Regional Fisheries Associations

A. FAO Regional Bodies in which the United States Participates

The FAO handles fisheries matters through its Department of Fisheries. In 1965 the Department organized the Committee on Fisheries (COFI) giving the FAO a policy-making arm with regard to the living marine resources of the world. Since its inception COFI has encouraged the growth of regional bodies to deal with fisheries matters and has participated in detailed review of FAO fisheries policies.

In addition to COFI, eight regional bodies have been formed under the auspices of the FAO. They are the:

1. Regional Fishery Advisory Commission for the Southwest Atlantic (CARPAS);

2. Fisheries Committee for the East Central Atlantic (CECAF);

3. Committee for Inland Fisheries of Africa;

4. European Inland Fisheries Advisory Commission (EIFAC);

5. General Fisheries Council for the Mediterranean (GFCM);

6. Indian Ocean Fishery Commission (IOFC);

7. Indo-Pacific Fisheries Council (IPFC); and

8. Western Central Atlantic Fishery Commission (WECAFC).

The United States is a member of four of these commissions: CECAF, IOFC, IPFC, and WECAFC. Since the scope of this paper deals only with the impacts of United States unilateral extension of fishery jurisdiction on international fisheries arrangements, the remaining four FAO regional commissions will not be treated here.

1. Fishery Committee for the Eastern Central Atlantic (CECAF)

The Fishery Committee for the Eastern Central Atlantic was established in 1967. Its area of competence is the Eastern Central Atlantic between Cape Spartel and the Congo River and present members of the committee include 28 nations. The main function of the Committee is to promote rational use of all species in the area via increased and better scientific research and more effective data collection and dissemination. Management responsibilities were assumed by CECAF in 1971 with the adoption of minimum mesh size regulations for sea bream and hake.

Coastal areas of the United States do not border on the area of competence of this Committee. However, with United States unilateral extension of jurisdiction over fisheries, other nations of this regional body may be

encouraged to follow suit if they have not already done so. If this should happen, several difficult problems, already in existence, will be accentuated. These include:

(a) the absence of management capacity within coastal nations still regarded as in the process of development;

(b) the difficulty in reaching agreement on total allowable catch for heavily exploited stocks, when the coastal nations fishing in the area share authority over the same stocks;

(c) the lack of criteria available to coastal nations for guidance in the setting of national quotas for shared stocks, particularly when previous experience is not applicable; and

(d) the likelihood that southern coastal nations, in seeking access to the rich northern fishing grounds, will be unable to effectively compete with distant water fleets.[13]

2. Indian Ocean Fishery Commission (IOFC)

The Indian Ocean Fishery Commission (IOFC) was established in 1967 via a resolution of the FAO Council. It claims competency over all species in the Indian Ocean as well as in adjacent sea areas (not including, however, the Antarctic Ocean area).

The terms of reference of the IOFC are sufficiently broad so that tentative movements toward management have already been taken. Ad hoc groups have been set up for shrimp, for the fisheries in the Gulf of Oman and the Persian Gulf, and for tuna. There does not appear either to be any need for changing the defined area of competence, the membership or the internal structure of the organization.

The reason for this, besides adequate flexibility in the original terms of reference, is that in the Indian Ocean the major problems are the ones of development, not management. This places a high priority not only on facilitating surveys and stock assessments but equally on increasing coastal state capabilities to catch, process and market fish. There is clearly the need for management measures to be implemented on shrimp and there is a need for regulation of the larger tunas, though the skipjack resources are under-exploited.

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[13] Edward Miles, An Assessment of the Impact of Proposed Changes in the Law of the Sea on Regional Fishery Commissions, on FAO Technical Assistance Programmes in Fisheries and on the FAO Committee on Fisheries and Department of Fisheries, (COFI: c/4/76 Inf. 3. Prepared for Committee on Fisheries, Sub-Committee on the Development of Cooperation with International Organizations Concerned with Fisheries, 4th session, Lisbon, 8-12 March 1976. Rome: FAO, February 1976), p. 18.

There is a number of actual and potential conflicts between countries over shared stocks but these can be dealt with bilaterally.[14]

As in the case of CECAF, the United States does not have any coastal area bordering on the Indian Ocean. However, with United States unilateral extension of jurisdiction over fisheries, other nations of this regional body may be encouraged to follow suit.

> In the event of extensions to 200-mile Economic Zones all the demersal and shrimp resources will come under national jurisdiction. Only the tuna resources will be outside the 200 miles yet,... it will not be possible to solve this problem in the Indian Ocean alone. Extensions of jurisdiction will increase the number of bilateral agreements concerning joint ventures and the setting of license fees and...they would accentuate the need for technical assistance in production, processing and marketing. For this reason the IOFC should play a much more active role than it has so far in promoting and coordinating national fisheries development activities.[15]

3. Indo-Pacific Fisheries Council (IPFC)

The Indo-Pacific Fisheries Council (IPFC) was established in 1948 in order to direct development and effective utilization of all species in the Indo-Pacific area. This involves some overlap with the IOFC and successful continuance of both organizations appears contingent on a clearer specification of the area of competence of each.

Again, the United States does not have a coastline bordering on this particular region. However, United States unilateral extension of jurisdiction might suggest to other nations in the regional area that they make a similar move.

> The most urgent management problems are currently in the South China Sea. These involve some demersal species, particularly in the Northern Gulf of Thailand, some local shrimp stocks and the large tunas. Since extension of jurisdiction will have serious impacts on the world tuna fishery, this will also be an urgent problem, particularly in the Trust Territories Subregion. There is an additional problem in the case of the South China Sea which makes dealing with the management issue more difficult. This concerns the significant political differences between certain countries in the area.
>
> In order to make these changes certain modifications will have to be made in the Basic Texts of the IPFC. For instance the list of members will have to be expanded; a general formulation will have to be added to the current terms of reference giving the IPFC the capacity to make recommendations on any management measures that appear to be necessary; in the terms of reference

[14] Ibid., p. 16.

[15] Ibid.

of the Council an objection procedure should be specified whereby recommendations on management become operative after a certain period in the event of no objections being made by any member; and, finally, it should be stipulated that decisions shall be made on the basis of a two third majority.

The aim in proceeding in this way is to give the organization both the competence to make recommendations and the flexibility to adapt to changing situations. It therefore does not seem to be advisable to enumerate the kind of management recommendations the IPFC could make. The effect would be limiting and could retard the organic development of the Council in response to very dynamic external situations. For reasons of flexibility also, an objection procedure is recommended.

In its approach to management problems, it would also increase flexibility if the Council would establish ad hoc and/or permanent subsidiary panels as necessary on statistics and stock assessment for the three subregions. These would give the IPFC the capability of separating the research and stock assessment work from its involvement in management recommendations since these subsidiary bodies could be restricted in membership to the countries actually affected by any particular problem.[16]

4. Western Central Atlantic Fishing Commission (WECAFC)

The Western Central Atlantic Fishery Commission (WECAFC) was established in 1973 to promote data collection, coordinate research, and assist member nations in establishing rational management programs.

Since WECAFC has no management responsibilities, unilateral United States extension of jurisdiction is likely to have little measurable impact on this regional body.

[16] Ibid., pp. 15-16.